REPORT RESUMES

ED 011 562 VT 002 318

REVIEW AND SYNTHESIS OF RESEARCH IN AGRICULTURAL EDUCATION.
BY- WARMBROD, J. ROBERT PHIPPS, LLOYD J.
OHIO STATE UNIV., COLUMBUS CTR. VOC. AND TECH. ED

PUB DATE AUG 66
EDRS PRICE MF-$0.27 HC-$6.20 155P.

DESCRIPTORS- *AGRICULTURAL EDUCATION, *EDUCATIONAL RESEARCH, *BIBLIOGRAPHIES, *REVIEW (REEXAMINATION), TECHNICAL EDUCATION, EDUCATIONAL OBJECTIVES, EMPLOYMENT OPPORTUNITIES, CURRICULUM DEVELOPMENT, TEACHING METHODS, LEARNING PROCESSES, TEACHER EDUCATION, EDUCATIONAL FACILITIES, EDUCATIONAL NEEDS, EDUCATIONAL PROGRAMS, EDUCATIONAL TRENDS, SUPERVISED FARM PRACTICE, STUDENT CHARACTERISTICS, VOCATIONAL AGRICULTURE TEACHERS, COLUMBUS, ERIC CLEARINGHOUSE

OVER 400 STUDIES WERE CONSIDERED IN PREPARING THIS REPORT ON AGRICULTURAL EDUCATION RESEARCH CONCLUSIONS, TRENDS, METHODOLOGY, AND NEEDS. THOUGH EMERGENCE OF CORRELATIONAL AND EXPERIMENTAL RESEARCH IS EVIDENT, RESEARCH IN AGRICULTURAL EDUCATION HAS BEEN LARGELY DESCRIPTIVE. WEAKNESSES IN PROBABILITY SAMPLING AND SURVEY TECHNIQUES HAVE BEEN EVIDENT, ESPECIALLY RELATIVE TO NONRESPONSE. IMPLEMENTATION OF FINDINGS REMAINS A MAJOR PROBLEM, THOUGH PILOT PROGRAMS, POPULARIZED REPORTS, AND COORDINATED APPROACHES HOLD PROMISE OF ALLEVIATING THE PROBLEM. INDIVIDUAL GRADUATE RESEARCH STUDIES HAVE BEEN MOST PREVALENT, AND THESE HAVE BEEN LIMITED BY SHORT DURATION AND HAVE LACKED CUMULATIVE EFFECTS AND CHANCES OF IMPLEMENTATION. COORDINATED STUDIES HAVE BEEN CONDUCTED ON EMPLOYMENT OPPORTUNITIES AND NEEDED COMPETENCIES. THE CURRENT RESEARCH REFLECTS NEW DEVELOPMENTS AND INTEREST IN CURRICULUM, POST-HIGH SCHOOL TECHNICAL EDUCATION, SUPERVISED EXPERIENCE, INNOVATIONS, EVALUATION, AND PERSONNEL ROLES. CONCLUSIONS AND FURTHER NEEDS WERE IDENTIFIED IN THESE AND SEVERAL OTHER AREAS INCLUDING (1) INSTRUCTIONAL MATERIALS, (2) TEACHING AND LEARNING, (3) STUDENT ORGANIZATIONS, (4) GENERAL AGRICULTURE, (5) PERSONNEL PREPARATION, (6) ADMINISTRATION AND SUPERVISION, AND (7) RESEARCH DESIGN. (JM)

ED011562

Review and Synthesis of Research in

AGRICULTURAL EDUCATION

THE CENTER FOR VOCATIONAL AND
TECHNICAL EDUCATION
The Ohio State University
980 Kinnear Rd.
Columbus, Ohio 43212

VT 02318

The Center for Vocational and Technical Education has been established as an independent unit on The Ohio State University campus with a grant from the Division of Adult and Vocational Research, U. S. Office of Education. It serves a catalytic role in establishing a consortium to focus on relevant problems in vocational and technical education. The Center is comprehensive in its commitment and responsibility, multidisciplinary in its approach, and interinstitutional in its program.

The major objectives of The Center follow:

1. To provide continuing reappraisal of the role and function of vocational and technical education in our democratic society;
2. To stimulate and strengthen state, regional, and national programs of applied research and development directed toward the solution of pressing problems in vocational and technical education;
3. To encourage the development of research to improve vocational and technical education in institutions of higher education and other appropriate settings;
4. To conduct research studies directed toward the development of new knowledge and new applications of existing knowledge in vocational and technical education;
5. To upgrade vocational education leadership (state supervisors, teacher educators, research specialists, and others) through an advanced study and in-service education program;
6. To provide a national information retrieval, storage, and dissemination system for vocational and technical education linked with the Educational Research Information Center located in the U. S. Office of Education;
7. To provide educational opportunities for individuals contemplating foreign assignments and for leaders from other countries responsible for leadership in vocational and technical education.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

REVIEW AND SYNTHESIS OF RESEARCH IN AGRICULTURAL EDUCATION

J. Robert Warmbrod
Associate Professor
Vocational and Technical Education
Agricultural Education Division
University of Illinois
Urbana, Illinois

Lloyd J. Phipps
Professor of Vocational and Technical Education
Chairman, Agricultural Education Division
University of Illinois
Urbana, Illinois

August 1966

The Center for Research and Leadership Development in
Vocational and Technical Education
980 Kinnear Road
The Ohio State University
Columbus, Ohio

The Work Presented Or Reported Herein Was Performed Pursuant To A Grant From The U. S. Office Of Education, Department Of Health, Education & Welfare.

INTRODUCTION

In keeping with The Center's responsibility for stimulating and facilitating research in vocational and technical education and its commitments to information retrieval and dissemination, this Review and Synthesis of Research in Agricultural Education has been developed. The stimulus for this paper evolved from the recognition of need for establishing a base or "benchmark" for current research efforts and for the national information retrieval and dissemination system being developed by The Center and linked to the Educational Research Information Center in the U.S. Office of Education.

This review paper should aid researchers and practitioners in assessing the current state of the art in research for the field of agricultural education. Further, it should assist in identifying voids in our present research framework and help "sharpen" future studies, both in terms of their substantive focus and methodological approaches. It is logical to assume that this compact review should also assist practitioners in accelerating the applications of research findings to current practice in vocational and technical education programs.

It is recognized that since the ERIC network and its information retrieval and dissemination system was not yet operative when this paper was prepared, the review is subject to gaps and that, in the main, the paper does not reflect the rapidly evolving findings generated by funds available through Section 4(c) of PL 88-210. Admittedly, the authors had problems in securing all available material, but nevertheless, in our judgment, they have done a splendid job of "pulling together" the significant research in the area.

This paper is one of seven published by The Center dealing with research in a substantive area of vocational and technical education. Other research review papers include: Business and Office Education; Distributive Education; Home Economics Education; Industrial Arts Education; Technical Education; Trade and Industrial Education.

Through The Center and the ERIC Clearinghouse for Vocational and Technical Education, it is anticipated that in the immediate future, other research review and synthesis papers will be developed to assist the profession in assessing an updated "state of the art" and of the potential impact of research on educational practice.

We are indebted to J. Robert Warmbrod and Lloyd J. Phipps for their scholarship and efforts in providing the profession with this new benchmark and perspective on research in agricultural education. Recognition should be given to Dr. Gene Love, Associate Professor, Agricultural Education, Pennsylvania State University, University Park, Pennsylvania, for his critical review and helpful suggestions for refining the manuscript prior to publication. Acknowledgment is also due Dr. Virgil E. Christensen, of The Center staff, for coordinating the work of the several authors.

Final acknowledgment is given to Dr. James W. Hensel, Specialist in Agricultural Education, at The Center, for his review and assistance in the development of this publication.

We solicit the suggestions and comments of the profession for improving these publications.

Robert E. Taylor
Director

PRECEDING PAGE BLANK- NOT FILMED

PREFACE

A primary purpose of this review and synthesis of research is to indicate the state of research in agricultural education. The report is prepared primarily for persons interested in further research and development in agricultural education. Some generalizations and conclusions warranted by the research are indicated; emerging trends which research portends are noted; the methodology of research in agricultural education is examined; and some areas of need for research in agricultural education are identified. More than four hundred studies conducted during the past five years were considered in preparing the report.

"Agricultural education," for the purpose of this review and synthesis of research, was defined as public school education in agriculture. Research pertaining to agricultural instruction in elementary, secondary, and post-high school institutions was considered. Excluded was research which had as its main focus programs of agricultural education in institutions of higher education which lead to baccalaureate or advanced degrees and research relating to programs of agricultural education which are not conducted through the public school system; for example, extension education in agriculture. Also excluded were studies conducted in the United States that pertained to agricultural education in other countries.

Additional criteria were established for selecting materials for review. Generally, research reported prior to 1960 was not cited. Exceptions to this criterion were made when studies which appeared prior to 1960 were particularly relevant and significant to research reported during the first half of the present decade. Highest priority was given to those studies which due to design, findings, or conclusions have implications of wide applicability. By and large, studies which pertain to a local community or a local school district were excluded from the review.

Materials reviewed in this report were obtained from colleges and universities, state departments of education, professional journals, and other publications reporting research in agricultural education. Preference was given to materials that are available to the researcher through libraries or other sources.

These are significant times for research in agricultural education. The influence of state and federal appropriations earmarked for research and development in vocational education is beginning to be identifiable. A noteworthy impetus to research in agricultural education is the establishment of regional and national centers which have as their purposes the stimulation and coordination of research and the dissemination and implementation of research findings. It is hoped that this review and synthesis of research in agricultural education will provide the benchmark against which these new dimensions can be appraised.

The assistance of Daniel E. Vogler and Vincente Quiton, graduate assistants in the Agricultural Education Division, University of Illinois, in the preparation of this report is appreciatively acknowledged.

J. Robert Warmbrod
Lloyd J. Phipps

PRECEDING PAGE BLANK-NOT FILMED

TABLE OF CONTENTS

Page

INTRODUCTION iii
PREFACE vii
PHILOSOPHY AND OBJECTIVES 1
MANPOWER NEEDS AND EMPLOYMENT OPPORTUNITIES 9
  Farming Occupations 9
  Nonfarm Occupations Involving a Knowledge of Agriculture. . . . 13
CURRICULUM DEVELOPMENT. 21
  Techniques for Determining Curriculum Content 22
  Methods of Clustering Competencies and Jobs 28
  Findings of Curriculum Research 30
EDUCATIONAL PROGRAMS. 35
  Nonvocational and General Education 35
  Vocational Education in Agriculture for High School Pupils. . . 36
  Technical Education 42
  Adult and Continuing Education. 45
  Agricultural Education for the Disadvantaged. 49
  Supervised Agricultural Experience Programs 51
INSTRUCTIONAL MATERIALS AND DEVICES 56
LEARNING PROCESSES AND TEACHING METHODS 59
STUDENT PERSONNEL SERVICES. 68
  Characteristics of Pupils 68
  Educational Aspirations and Plans of Pupils 71

Page

Occupational Aspirations and Plans of Pupils. 73

FACILITIES AND EQUIPMENT. 76

TEACHER EDUCATION 77

Description and Appraisal of Programs of Teacher Education. . 77

The Teacher and the Role of the Teacher 78

Recruitment and Retention of Teachers 81

Student Teaching in Agricultural Education. 85

Inservice Education 87

ADMINISTRATION AND SUPERVISION. 90

Administration and Supervision of State Programs of Agricultural Education. 90

Administration of Programs of Agricultural Education in Local Schools. 93

Advisory Committees 94

Professional Relationships. 95

EVALUATION 96

Success in College. 98

Occupational Status of Former Enrollees in Vocational Agriculture. 101

Success in Farm and Nonfarm Occupations 106

Assessment of the Achievement of Enrollees. 109

RESEARCH. 109

CONCLUSIONS AND RECOMMENDATIONS 112

BIBLIOGRAPHY. 119

PHILOSOPHY AND OBJECTIVES

During the first half of the present decade, the philosophy and objectives of agricultural education have undergone significant reexamination and revision. This refocusing and enlargement of purpose has been paralleled only by the alteration of the objectives of agricultural education which occurred during the historic period preceding and immediately following the enactment of the Smith-Hughes Act in 1917. The emphasis of public school education in agriculture has shifted during the past five years away from a program with the stated aim of proficiency for those who have entered upon or are preparing to enter upon the work of the farm or the farm home. Emerging programs emphasize, in addition to preparation and advancement in any occupation involving knowledge and skill in agriculture, the concomitant objectives of occupational exploration, guidance and counseling, and the development of abilities essential for effective citizenship. Just as the Smith-Hughes Act inaugurated a period which accentuated the education of present and prospective farmers as the primary aim of agricultural education in the public schools, the enactment of Public Law 88-210, the Vocational Education Act of 1963, launched a stage of agricultural education during which broadened and revised objectives are being stressed.

Warmbrod (1962) cited data which indicated that agriculture was taught in the public schools prior to 1917 primarily as an informational or general education subject. Few schools offered agriculture for vocational purposes--that is, preparation for farming. Reports of the Federal Board for Vocational Education were quoted which claimed as outstanding advances of the federally-aided program of vocational education that the trend in high school instruction in agriculture had been definitely turned toward vocational efficiency and that agriculture as an informational and cultural subject had almost entirely disappeared from the curriculum of the high school. Reviewing research some 30 years later, Hamlin and Deyoe (1950) identified one of the principal trends in public school education in agriculture as the development of vocational courses and the gradual reduction of courses which were not vocational in purpose. The trend was attributed primarily to the fact that federal financial assistance was extended to vocational courses only.

From time to time formal pronouncements of the objectives of vocational education in agriculture have been made. The first of these reports, issued by the Federal Board for Vocational Education (1931), proclaimed that the primary aim of vocational education in agriculture was to train present and prospective farmers for proficiency in farming. Subsequent editions of the publication issued by the U.S. Office of Education (1940, 1955) reaffirmed this position but asserted that a statement of the aims and objectives of vocational education in agriculture must be in harmony with and support the general objectives and philosophy of public school education. Hamlin (1962) argued that the objectives of vocational education in agriculture which were promulgated in the U.S. Office of Education publications should not be construed to be the guiding purposes of the total program of agricultural education in the school system. Hamlin contended that the objectives indicated clearly that vocational education in agriculture is a specialized kind of agricultural education and that the list of objectives has led to an over-simplification of public school education in agriculture by its restriction to programs with vocational purposes.

Reviewers of research in agricultural education have reported varying conclusions pertaining to the evolution of thought concerning the philosophy and objectives of agricultural education. Smith (1944) proposed that the desired outcome of instruction in vocational agriculture was the establishment of pupils in farming vocations. Sledge (1960) concluded that the aims and objectives of agricultural education had undergone little revision from their first conception. However, he reported research in agricultural education which indicated that controversy existed as to whether or not the aim should be broadened beyond training for farming to include selected agricultural and business occupations. Phipps' (1956) review of research indicated that midway through the last decade professional workers in agricultural education had begun to re-examine the objectives of vocational education in agriculture. His review stated that teacher educators in agriculture, although placing primary emphasis on establishment in farming as a major objective, were recognizing as accompanying objectives of vocational education in agriculture the preparation for employment in occupations related to farming and the provision for occupational guidance and counseling of students.

Phipps (1962a) identified the period 1956 to 1962 as being significant for the initiation of studies investigating the various aspects of agricultural education relating to the nonfarm occupations in agriculturally-oriented businesses and industries. Studies conducted during this period provided the basis for the revision of the purposes of vocational education in agriculture which were formalized in the Vocational Education Act of 1963. Clark's (1962) research contributed to the movement which advocated broadened objectives of vocational education in agriculture. G. B. James (1962) and Thompson (1962a) related new dimensions in agricultural education in North Carolina and California which forecasted widespread acceptance of a revised philosophy of agricultural education, particularly in reference to vocational and technical education in agriculture.

In an intricately designed study Nelson, Woerdehoff, and Coster (1960) asked specialists in agricultural education, school administration, and curriculum construction to appraise 25 purposes of vocational education in agriculture for importance in relation to current social, economic, and technical trends. They reported that high school principals, when asked to indicate the extent to which each purpose was accepted as a goal of the program of vocational agriculture, tended to accept the purposes in the order in which the jury assigned scores indicating importance in light of contemporary social, economic, and technical trends. Notable exceptions, however, were that principals rated the purposes relating to leadership and citizenship development and to occupational adjustment more important than the jury. As was the case with ratings by the jury of specialists, the principals indicated relatively low priority to goals pertaining to occupational exploration and general education in agriculture.

The study just cited (Nelson et al., 1960) is significant in at least three aspects. First, the findings reveal that at the close of the last decade educators continued to perceive the development of vocational proficiency in farming as the major objective of vocational education in agriculture. Second, high school principals, while accepting the purpose of occupational proficiency, recognized vocational education in agriculture as contributing substantially to the development of leadership and citizenship. Third, neither the jury of educators nor high school principals perceived occupational exploration or general education as significant purposes of a vocationally oriented program of agricultural education.

Beam (1961) identified 31 socio-economic trends which affect local programs of vocational education in agriculture. He concluded that the purposes of vocational education in agriculture should be broadened to include the development of appreciations, skills, and knowledges which are needed for employment in agricultural occupations other than farming and that the program provide effective guidance services for youth preparing for occupations in agriculture.

The research indicated that the evolving objectives of agricultural education were accepted readily, if not anticipated, by school administrators, parents, and persons enrolled in vocational agriculture programs. The Research Committee of the Southern Region (1956), using a well-designed two-stage sampling procedure, surveyed high school pupils, farmers, school administrators, and teachers of agriculture in 12 southern states to determine their attitudes concerning the major purpose of vocational education in agriculture. Only 15 per cent of the interviewees indicated that the controlling purpose of vocational education in agriculture was to train for useful employment and proficiency in farming. Almost one-half of the persons interviewed indicated that the purpose of vocational agriculture should be to train for useful employment and proficiency in an agricultural occupation, farming or an occupation related to farming. One-third of the respondents chose as the controlling purpose the general objective of training good citizens, intelligent consumers, and efficient producers. Espenschied (1961) found that parents, although in some cases uninformed about vocational education in agriculture, valued highest among the outcomes of vocational agriculture, not vocational preparation, but changes in their son's work habits, interests, attitudes, and character attributes which contribute to success in any occupation.

Douglas (1962) reported that school administrators in Idaho were of the opinion that the purposes of vocational education in agriculture should emphasize preparation for occupations related to farming, occupational guidance, and preparation for college. A recent study by Brown (1965) indicated that both teachers of agriculture and administrators in Oklahoma were in agreement concerning the desirability of expansion of the program of vocational education in agriculture to include training in the nonfarm agricultural occupations.

The Panel of Consultants on Vocational Education (1963), cognizant of the need for revision of the purposes of vocational education in agriculture, recommended that legislation restricting federally-aided programs to those oriented primarily toward farming be changed to recognize that agriculture is no longer based on production alone. Legislation which followed, the Vocational Education

Act of 1963, stated explicitly that funds allotted or appropriated under the provisions of federal legislation "may be used for vocational education in any occupation involving knowledge and skills in agricultural subjects, whether or not such occupation involves work of the farm or of the farm home." A Joint Committee of the U.S. Office of Education and the American Vocational Association (1965), using this statement of purpose as a basis, developed a list of the major objectives for vocational and technical education in agriculture. These major objectives stress the development of occupational competencies needed by individuals engaged in or preparing to engage in production agriculture and in agricultural occupations other than production agriculture. In addition, the objectives developed by the committee indicate clearly and positively that among the major purposes of vocational education in agriculture are the development and understanding of career opportunities in all occupations requiring knowledge and skill in agricultural subjects, the preparation needed for entry and advancement in these occupations, and the development of abilities in human relations and leadership essential for citizenship.

Phipps (1962a) reported a resurgent interest in nonvocational education in agriculture resulting in programs which emphasize the development of an understanding and appreciation of agriculture helpful to all as useful citizens. This facet of agricultural education was recognized in a statement on the role of agricultural education in the public schools which was developed by seminar participants at the National Center for Advanced Study and Research in Agricultural Education (1963a). Hamlin (1962) and Phipps (1965a) stressed that the purposes of general and nonvocational education in agriculture should be emphasized as well as the vocational purposes of agricultural education.

From the foregoing, four conclusions appear tenable. First, the objectives of agricultural education in the public schools are generally considered to be synonymous with the objectives of vocational and technical education in agriculture. The result is that programs of vocational and technical education in agriculture are construed to constitute the total program of agricultural education in the public schools. This point of view accentuates the role of agricultural education as occupational preparation and advancement but at the same time it minimizes the general education function of agricultural education. Leaders in agricultural education are suggesting, however, that agricultural education be more than vocational education in agriculture.

Second, the occupational orientation of vocational and technical education in agriculture has been broadened in at least two dimensions. The first dimension is obvious--education for any occupation involving knowledge and skill in agriculture. The second is of equal import and is the point of view, which appears to be emerging prominently, that the purposes of vocational education in agriculture include occupational exploration, guidance and counseling, preparation for more advanced study of agriculture, and the development of abilities essential for success in any occupation. Current thinking seems to encompass the idea that enrollment in vocational agriculture, especially in rural areas and in beginning courses, may serve as an exploratory experience for those students who have not made an occupational choice or are undecided about their choice of occupation.

Third, purposes relating to general, nonvocational, and avocational education in agriculture receive low priority in a program of agricultural education which has as its focus occupational preparation and advancement. No national group actively promotes the general and nonvocational aspects of agricultural education. Research has proven to be a forceful tool in reshaping the objectives of vocational education in agriculture. Hence, an area of study which should command high priority by researchers in agricultural education is that pertaining to the need, value, and outcomes of general and nonvocational education in agriculture.

Fourth, a narrowly defined purpose of vocational education in agriculture, occupational proficiency, has not been accepted by students, teachers, administrators, or parents as the sole purpose of agricultural education. The values of instruction in agriculture have been considered to be much broader than occupational proficiency.

MANPOWER NEEDS AND EMPLOYMENT OPPORTUNITIES

Farming Occupations

Data indicating the need and opportunity for persons to enter the world of work as managers and operators of farms are limited almost exclusively to national projections. Economists often base their estimates of the need for new farm operators on the following assumptions: first, that a farm with annual sales of at least $10,000 is the minimum size of operation for an adequate family income; second, that the number of farms with annual gross sales of $10,000 or more will continue to increase; third, that life expectancy rates for the total male population apply to farm operators; fourth, that all farmers 65 years of age or older in 1960 will die or retire within 10 years.

Shoemaker (1961) estimated that the replacement need for farm operators in the United States on farms having $10,000 or more gross sales would be 143,485 during the 10-year period 1959 through 1968. If the number of replacements needed on commercial farms with annual sales of $5,000 or more were considered, 282,460 new farm operators would be needed during the 10-year period. A more recent estimate of the need for new farm operators by Bishop and Tolley (1963) indicated that 150,253 commercial family farms with annual sales of $10,000 or more will be available during the 1960-1969 decade in the United States. So, national estimates indicate an average annual need for new full-time commercial farm operators of approximately 15,000 during the present decade.

Frequently the comparison is made between the number of farm operators to be replaced during 1960-1969 and the number of rural farm boys, 10 to 19 years of age, in 1960. The latter are assumed to be the number of potential farm operators who will be available during the decade. Making this comparison with national data, Bishop and Tolley (1963) estimated that there will be approximately 10 potential young farmers for each farm with annual sales of $10,000 or more which will become available to new operators during the 1960's. Similar comparisons by regions showed considerable variation. In the south, there would be 17 potential farmers for each available farm with annual sales of $10,000 or more. In the west, the other extreme, five young men would be available for each farm replacement needed.

National and regional data of this nature are grossly inadequate and easily misused. First, a comparison of the number of rural farm boys to the number of farm replacements needed during a given period of time is a misleading indication of the occupational opportunities for farm boys. It assumes that all farm boys have the desire, interest, and aptitude to enter farming as their life's work. Second, national data imply, and are taken for granted in the absence of data to the contrary, that these so-called occupational opportunities for farm boys hold for all states within a region or for all communities in a state. Third, the use of these data imply that no vocational education in agriculture is needed for part-time farming and noncommercial farming.

Studies conducted in local communities reveal the inadequacy of national and regional projections of manpower needs in farming. Clover (1962) and Swanson (1961), studying the need for beginning farmers in two communities in Iowa, found that the number of farms available each year exceeded the number of young men graduating from high school who desired to farm. Ganzel (1964) found that projections based on death rates, expected retirements, and consolidation of farms underestimated the number of farming opportunities in a Nebraska school district. Estimates of the number of farms to become available in Nebraska during the 1960's and 1970's indicated that there would be approximately three opportunities to enter farming for each high school graduate who desired to farm (Horner and Benson, 1963).

Other studies, indicating the need for well-trained farm operators, reveal that a substantial proportion of farm operators have not received instruction in vocational agriculture. Hemp (1962) reported that less than 50 per cent of the beginning farmers in Illinois had taken vocational agriculture in high school. K. E. James (1961) found that only 30 per cent of a group of randomly selected farmers in Missouri had been enrolled in vocational agriculture in high school; only 43 per cent of the farm operators who had graduated from high school had completed some instruction in agriculture. Lester (1961) discovered that only 51 per cent of a group of young farmers in Missouri had completed three or four years of vocational agriculture in high school. O'Kelley and Lester (1965) found that 27 per cent of a group of randomly-selected farmers in Georgia had studied agriculture in high school.

Additional data indicate that in many areas in the United States insufficient numbers of pupils are receiving instruction in vocational agriculture to provide the number of farm replacements needed, especially when allowance is made for the fact that all pupils studying agriculture in high school do not desire to farm and the fact that many pupils studying vocational agriculture are preparing for nonfarm occupations requiring knowledge and skill in agricultural subjects. For example, Quam (1965) established that the opportunity existed for nine farm replacements each year in a local school district in Minnesota, only four of which were usually filled by graduates who had studied vocational agriculture. The Panel of Consultants on Vocational Education (1963) reported that in 1960-61, 3.5 per cent of the total population in the United States, 15-19 years of age, was enrolled in vocational agriculture in high schools. During the same year, the number of persons employed in the production phases of agriculture represented 8.2 per cent of the total number of persons employed. These data led the Panel of Consultants to conclude that "a question might be raised concerning the extent to which some states are providing sufficient agricultural education to meet employment requirements" in production agriculture.

The research is adequate to point out that projections of the number of farm replacements needed for the nation or a region may underestimate the occupational opportunities in farming in some communities and states. Conversely, national projections probably overestimate the opportunities for establishment in farming in some communities. In either case, the facts should be known if programs of vocational education in agriculture are to be planned which are responsive to manpower needs and employment opportunities. Researchers in agricultural education, with the exception of a few teachers of agriculture, have been reluctant to design and conduct studies which adequately assess the opportunities for establishment in farming.

Nonfarm Occupations Involving a Knowledge of Agriculture

No facet of agricultural education has been more widely and thoroughly investigated during the past five years than that pertaining to manpower needs and employment opportunities in the nonfarm occupations which involve knowledge and skill in agriculture. The pioneering studies in this area have been summarized and reviewed by Hemp (1962) and Phipps (1962a). The number of studies designed to identify present and emerging nonfarm occupations which have been conducted in local communities is legion. These studies have led invariably to the development of new programs of vocational education in agriculture designed to prepare for gainful employment in numerous nonfarm agriculturally-oriented occupations and in nonagricultural occupations requiring knowledge and skill in plant and animal science and related mechanics. Within the last three years, investigations have been completed in 26 states which indicate state-wide or area employment needs in nonfarm business and industrial firms for persons possessing knowledge and skill in agriculture. A report of the synthesis of these studies was published by The Center for Research and Leadership Development in Vocational and Technical Education (1965e). The studies reported in the publication just cited had as major purposes (a) the identification of present and emerging nonfarm occupations involving competencies in plant, animal, and soil science and agricultural mechanics, (b) the estimation of the number of workers needing agricultural knowledge currently employed and the estimation of the number of workers needed in the future, and (c) the determination of the competencies in agriculture and related fields of study needed by workers in the nonfarm occupations.

The significant findings of the state-wide and area studies relating to manpower needs and employment opportunities which were concisely reported in the aforementioned publication are as follows: (a) approximately one-half of the workers employed in the nonfarm agriculturally-oriented businesses need education or training in agriculture; (b) employers estimated that there would be approximately a 20 per cent increase during the next five years in the number of employees who need competencies in animal, plant, and soil science and agricultural mechanics; (c) the types of business and industrial firms which indicated the greatest need for workers possessing agricultural knowledge and skill were sales and service businesses dealing in agricultural supplies, agricultural machinery sales and service firms, ornamental horticulture firms, and marketing and distribution businesses dealing in livestock and crop products.

As would be expected, considerable variation among the states was evident for each of the general findings reported in the preceding paragraph. For example, Barwick (1965) reported that 15 per cent of the employees in agriculturally-oriented businesses in Delaware needed agricultural competencies; Stevenson (1965) found that 38 per cent of all workers in nonfarm agricultural businesses in Oklahoma needed competency in agriculture; Hoover, McClay, and Stevens (1966) estimated that 46 per cent of the employees in agriculturally-oriented businesses in Pennsylvania needed a knowledge of agriculture; Judge (1965) indicated that 63 per cent of the workers in agricultural business firms in Massachusetts needed agricultural competencies. Similarly, employers' estimates indicating the percentage of increase in the number of workers possessing agricultural knowledge which would be needed during the next five years due to growth of business firms varied from an eight per cent increase in the metropolitan areas of Louisiana (Mondart and Curtis, 1965) to an increase of 41 per cent in Kansas (Agan, 1964).

In addition to the need for more workers created by the growth of business firms, substantial numbers of new employees are needed annually to fill positions created by the turnover of workers. Agan (1964) found that the number of additional workers possessing agricultural knowledge who were needed during a period of 12 months to fill jobs created by growth and turnover in nonfarm businesses in Kansas was 23 per cent of the number of workers employed at the time the study was made. A study (Warmbrod, 1966) of the employment needs in nonfarm business and industrial firms in the rural areas of Illinois revealed that the number of additional workers possessing agricultural knowledge and skill needed during a one-year period to meet demands created by growth of businesses and turnover of employees represented a 20 per cent increase over the number of agricultural workers employed when the interviews were conducted. Such rapid rates of turnover suggest ample opportunities for advancement in occupations in business and industry requiring knowledge and skill in agricultural subjects.

Although firms dealing with agricultural supplies, agricultural machinery, and ornamental horticulture consistently ranked highest in the number of workers currently employed and the number of workers needed in the future, there was marked variation among states in this respect. Of particular significance is the finding that workers needing agricultural knowledge and skill were employed in nonagricultural businesses as well as agriculturally-oriented businesses. Warmbrod (1966) reported that 43 per cent of the workers who needed agricultural knowledge and who were employed in nonfarm businesses in rural areas of Illinois were working in business and industrial firms that were classified as primarily nonagricultural in nature.

Some of the studies designed to ascertain employment opportunities in the nonfarm occupations have compared the number of workers employed in agriculturally-oriented business and industrial firms to the number of workers in production agriculture. Generally, it has been found that the number of commercial farms and the number of agricultural workers in the nonfarm businesses is approximately equal. Bailey (1964) found that the ratio of the number of commercial farms to the number of nonfarm agricultural workers in West Virginia was approximately one to one; Judge (1965) reported that the number of nonfarm workers in Massachusetts who need agricultural competencies was greater than the total number of persons engaged in farming in the state; Warmbrod's (1966) estimates for a 14-county rural area of Illinois indicated that for each worker needing a knowledge of agriculture employed in nonfarm businesses, 1.75 persons were working in farming occupations as commercial farm operators or hired farm workers. Rarely have comparisons been made between the anticipated employment needs in nonfarm businesses and the number of farm replacements needed during a given period of time. The study (Warmbrod, 1966) conducted in Illinois indicated that 3.5 nonfarm workers possessing agricultural knowledge and skill would be needed during a five-year period for each replacement needed during the same period for operators of farms with annual sales of $10,000 or more.

Evidence indicates that a majority of the employees in the nonfarm agricultural occupations are working in jobs for which post-high school education in agriculture and in certain other subjects is appropriate. Particularly is this finding true for those jobs in which the greatest number of employees will be needed in the future. Langdon (1965) reported that employers in Michigan estimated that 53 per cent of the nonfarm agricultural workers could be replaced with persons with high school diplomas, 32 per cent of the workers would need some post-high school education of less than a baccalaureate degree, 10 per cent of the workers would need a college degree, and four per cent would need a graduate degree in agriculture. Morrison (1964) and Bingham (1965) indicated that employers required formal education of at least high school level for all employees with the exception of a few semi-skilled and unskilled jobs. Cushman, Christensen, and Bice (1965) found that employers desired high school graduation for 57 per cent of the full-time workers in nonfarm occupations. They also reported that employers would accept less than high school graduation for 17 per cent of the workers; 18 per cent of the workers needed various levels of education beyond high school; for eight per cent of the workers, the level of education was not important. Phipps, Krebs, Hemp, Warmbrod, and Fuller (1964) reported that employers' opinions regarding the educational requirements of workers reflected their experiences based on educational programs in existence and the characteristics of the available labor force rather than on the level of education required for effective job performance.

The finding that employers prefer workers who have lived or worked on a farm for the nonfarm agriculturally-oriented businesses is substantiated by each study which has been designed to ascertain this information (Bingham, 1965; Langdon, 1965; Morrison, 1964; Stevenson, 1965).

Most of the studies pertaining to nonfarm agriculturally-oriented businesses have been well designed, competently executed, and clearly reported. The similarity of design among the various studies can be attributed primarily to the establishment of guidelines pertaining to design and procedures which were published by The National Center for Advanced Study and Research in Agricultural Education (1963b, 1964) at The Ohio State University.

Each study involved some plan of random sampling. In almost all cases, individual business firms were chosen as the sampling elements.

Frequently, a two-stage sampling procedure was used which called for stratification of the sampling elements, or primary units, or both prior to the time samples were drawn. Phipps et al. (1964) employed a two-stage cluster sampling technique which utilized telephone exchanges, stratified according to the population of the largest town in each exchange, as the primary or first-stage sampling unit from which business firms were drawn. Baker (1965) utilized counties, stratified by population and supervisory districts, as first-stage sampling units from which random samples of business and industrial firms were drawn. Cushman et al. (1965) chose school districts offering instruction in agriculture as the population for study. A stratified random sample of school districts was drawn using type of farming, school population, and value of taxable real property as criteria for stratification. The sampling designs used appear to have been chosen primarily to insure that all types of agriculturally-oriented businesses were represented in the sample of business firms to be studied.

There were additional characteristics of the studies which enhance the validity and reliability of the findings. In each case, data were collected through interviews conducted by trained interviewers. In most cases, the interview schedules had been field-tested and revised prior to the time interviews were made. Most researchers reported that instructional manuals were prepared for use by interviewers.

With one exception, the population of business firms from which businesses were selected for study included only those business firms which were thought to have employees who needed agricultural competencies. Evidence indicates that this restriction in the type of business chosen for study may have resulted in an underestimating of the number of workers needing knowledge and skill in agriculture. One study (Warmbrod, 1966) revealed that 57 per cent of the nonfarm agricultural workers in Illinois in areas with population centers of less than 25,000 were employed in businesses classified as agriculturally-oriented; 37 per cent of the workers needing knowledge and skill in agriculture were employed in businesses that were not agriculturally-oriented but employed workers who must have agricultural knowledge; while six per cent of the agricultural workers were employed in business firms that were categorized as nonagricultural businesses.

The extensive research which has been reviewed in this section clearly establishes the fact that the number of persons needing knowledge and skill in agriculture who are employed in the nonfarm businesses and industries servicing agriculture is substantial. Of even greater importance is the fact that the number of persons needed for employment in the future in these businesses is substantial and exceeds the opportunities for entry into farming. The findings do not warrant the conclusion that research in this facet of agricultural education is adequate. Research pertaining to the nonfarm sector of agriculture must continue if current and realistic appraisals of manpower needs and employment opportunities are to be made. The need for studies oriented toward the refinement of design and techniques of research in this area is highly important. Studies to date have relied upon estimates of employers concerning the number of additional workers needed to meet the demands created by business growth. In the not too distant future, a fruitful area of research will be follow-up studies to appraise the validity of those estimates.

CURRICULUM DEVELOPMENT

Reviews of research in agricultural education have indicated that research has traditionally motivated the reshaping and updating of curriculums in agricultural education (Hamlin and Deyoe, 1950; Sledge, 1960). The principle that programs of agricultural education should be based on and derived from the needs, problems, and aspirations of local communities has been accepted generally. Consequently, much of the research pertaining to curriculum development in agricultural education has been conducted in local communities for the specific purpose of devising curriculums applicable to particular localities.

Beam (1960), studying the relationship between socio-economic trends and programs of vocational education in agriculture in North Carolina, concluded that these trends were increasing the importance of local planning as a major characteristic of effective programs of vocational education in agriculture. Recent research pertaining to curriculum development in agricultural education both supports and, to a degree, differs with the conclusion. Emphasis in recent years continues to be focused on the study and investigation of the needs and problems of local communities as a basis for curriculum development. Yet another facet of curriculum research has emerged. Studies which encompass an entire state or area of a state are being conducted to provide data and information as a basis for determining the content of curriculums in vocational education in agriculture. A result of this approach is the development of curriculum guides and instructional materials which have wide applicability. This development in curriculum research has been a concomitant result of the movement toward broadened objectives of vocational and technical education in agriculture. The areas of emphasis in this broadened approach to curriculum research pertain to techniques of determining competencies needed by workers, determining competencies needed both by workers in production agriculture and in the nonfarm agricultural occupations, and the methods of clustering or grouping of occupations involving knowledge and skill in agriculture.

Techniques for Determining Curriculum Content

An analytical approach has been used by researchers as the primary procedure for determining curriculum content in agricultural education. Basically the approach has been that of occupational analysis, an attempt to identify the understandings and abilities needed by workers in occupations involving a knowledge of agriculture. Almost without exception, each study reviewed previously, which had as its primary purpose the estimation of manpower needs and employment opportunities for workers in the nonfarm agriculturally-oriented businesses, also had as a purpose the identifying of the competencies needed by these workers. Other studies have been designed specifically to elicit information and data necessary for curriculum development.

Courtney (1962) conducted a study designed to determine the common and differentiated job activities among three agricultural occupations--farmer, grain elevator manager, and farm real-estate broker. He developed an instrument consisting of 148 agriculturally-oriented activities which was administered to 40 workers in each of the three occupations. A random sampling procedure, involving stratification of communities by type of farming area, was used in selecting the sample of workers. Each worker judgmentally assigned a quantitative score to each of the 148 activities to denote the amount of knowledge and experience required for each aspect of his occupation.

Dillon (1965) attempted to determine whether or not separate and specialized courses in agriculture were needed for workers in nurseries and ornamental horticulture businesses. He designed a 100-item instrument through which he collected information from workers relative to the knowledge and degree of ability needed in performing various activities. Judgmental scores were assigned by a total of 160 workers, 20 workers in each of four job titles in each of the two types of businesses studied. The 20 licensed nurseries and the 20 licensed ornamental horticulture businesses were selected randomly. Data were collected during interviews conducted by the investigator. Fiscus (1965) conducted a study to determine the kind and depth of knowledge in agriculture needed by workers in farming, in grain elevator businesses, and in agricultural equipment businesses. He developed an instrument consisting of 103 items of knowledge to which a total of 180 workers responded by indicating the degree of understanding their job required for each item. A random sample of 20 businesses for each of three types of businesses was selected. Twenty farm managers and 20 workers in each of four different job titles in grain elevator businesses and agricultural equipment businesses were interviewed.

Albracht's (1966) study was designed to evaluate a process for determining curriculums in vocational education. He chose the sales function of the feed industry as the means for trying out the process. An interview instrument was developed which consisted of competencies which might be used to perform each of nine selected activities of the sales function. The instrument was developed in consultation with persons who were recognized as experts in the performance of the sales function of the feed industry. The instrument, administered through interviews conducted by the investigator, determined only if each competency was considered essential. The instrument was administered to a selected jury of experts which included six persons in each of the following categories: sales training directors, feed dealers, teacher educators in agriculture, and teacher educators in office education and distributive education. Gardner (1964) demonstrated a method of identifying competencies essential to the success of persons employed in nonfarm occupations. He developed a questionnaire consisting of 129 competencies needed by workers who sell, install, or maintain bulk tanks or milking systems. The questionnaire was completed by a panel of 11 persons considered to be authorities within or associated with the dairy industry and by a group of teachers of agriculture in Michigan. The panel members responded to the questionnaire by indicating the value and importance of each competency for workers in the phase of the dairy industry being studied.

A group of studies has been conducted at Iowa State University to determine the competencies needed by farmers and by workers in nonfarm agriculturally-oriented businesses. Bennett's (1965) study of the competencies in soil management and fertilizers needed by farmers and Kahler's (1964) study of the competencies needed by males employed in retail farm machinery distribution are illustrative of the techniques used to provide data for curriculum construction.

The techniques employed in each of the Iowa studies involved the development of a questionnaire consisting of a list of competencies needed by workers in the particular occupation being investigated. The list of competencies was developed by using specialists and selected farmers or businessmen. The questionnaires were mailed to a random sample or, in some cases, a selected group of farmers or businessmen. Respondents were asked to indicate the degree of competency needed and the degree of competency possessed for each item on the questionnaire. Halterman (1964) also used mailed questionnaires in a study to determine the educational needs of agricultural engineering technicians in Ohio. The questionnaires were designed to elicit information relative to the characteristics of the labor force in agricultural engineering, the kinds of activities in which technicians engage, and the competencies essential for satisfactory job performance. He reported that the percentage of returns of questionnaires from employers and technicians varied from approximately 33 per cent to 75 per cent.

Phipps et al. (1964) sought to obtain information needed for curriculum development by recording and analyzing the activities of employees relative to working: (a) with people both inside and outside the firm; (b) with products, materials, and services of the firm; (c) with equipment, tools, and instruments of the firm; and (d) with business problems of the firm. Employers were also asked to indicate areas of knowledge with which workers must be familiar for successful job performance. Data were collected by personal interviews.

Coupland (1962) used a consensual approach in an attempt to identify units of content which are essential to programs of instruction in agriculture and in an effort to develop a guide for the selection of agricultural content for curriculums in vocational agriculture. He developed a questionnaire consisting of a rating scale for teachers to record their opinions concerning the importance of selected areas of content for programs of instruction at the high school level. The questionnaire was mailed to a nation-wide sample of superior teachers who were selected by state supervisory personnel and to a nation-wide sample of teachers who were selected at random. Responses were received from 78 per cent of the superior teachers while only 53 per cent of the randomly-selected teachers returned the questionnaire. The approach used by Coupland for identifying curriculum content in agricultural education is inadequate when compared to the studies which utilized an analytical approach.

Studies utilizing the analytical approach for determining curriculum content can be appraised in at least three aspects--the instruments used for collecting data, the selection of subjects from whom data are obtained, and the means used (interviews versus mailed questionnaires) for collecting data.

An assumption of each of the studies cited was that valid and reliable instruments were used for collecting data about activities and competencies upon which curriculums were constructed. Courtney (1962) was the only investigator reporting a reliability coefficient for the instrument which had been developed. Validity of the instruments, admittedly difficult to ascertain, is enhanced considerably when recognized experts in the job or industry being investigated are consulted in the preparation of the instrument. Such a procedure should assure content validity for the instrument. No study has been reported which attempted to establish empirically the concurrent validation of an instrument by comparing the responses of the interviewee with ratings given by a person who supervises the interviewee on the job. Instruments which determine and analyze activities performed by workers may be more valid as a basis for curriculum construction than instruments designed to obtain workers' and employers' opinions concerning understandings and abilities needed for successful job performance. A technique for constructing instruments which has not been reported is that of systematic observation of workers over a period of time. The technique of job analysis through observation by the investigator has not been used extensively in curriculum research in agricultural education.

It can be argued that a random selection of persons, business firms, or jobs about which information is obtained for curriculum development is not the most appropriate method of selecting the elements of the situation to be studied. Should not curriculums in agricultural education include content and activities which lead to the highest level of competency attainable? In many cases it would be more appropriate to select a purposive rather than a random sample of persons or activities for investigation. Most of the techniques currently employed ask the subject for his judgment concerning the extent to which he possesses or needs a particular competency or group of competencies. The subject's only recourse is to respond in terms of his training and experience. When subjects are selected at random, the assumption is made that the competencies possessed or needed by those employed are the competencies which are needed by a well-trained labor force. The assumption may not be valid in all cases. The use of random selection of units for investigation is most feasible when studies are designed to accomplish the dual purpose of estimating manpower needs and for determining competencies needed by workers; however, a purposive sample is advantageous when studies are designed to accomplish the latter purpose only. For studies which are designed to appraise the degree of competency possessed by an individual or group of individuals, the preferable technique may be to get an evaluation from a person knowledgeable and qualified to appraise performance and competency rather than asking an individual for a self-evaluation of his competency.

There is no doubt that the interview technique is superior to mailed questionnaires for collecting data needed for curriculum development. Some of the problems of interpretation of items in the instrument can be avoided when interviews are used. The problem of nonresponse which is encountered with mailed questionnaires cannot be dismissed in research pertaining to curriculum development.

Methods of Clustering Competencies and Jobs

Curriculum research in agricultural education has as a central purpose the identification of a core of content which is applicable to both the farm and nonfarm occupations involving knowledge and skill in agriculture. An additional purpose is the identification of content for courses in agricultural industry at both the high school and post-high school levels. Courtney and Coster (1963) and Binkley (1965b) espoused the point of view that the basis for curriculum planning in agricultural education is the core of abilities required for farming. They maintained that the starting point in curriculum planning for vocational education in agriculture is the identification and selection of abilities required for farming. The next step, according to their point of view, is the identification and application of these abilities to occupations other than farming. Apparently this point of view has influenced much of the research pertaining to curriculum development since most of the investigations have employed techniques of analysis designed to identify the common elements between farming and nonfarm occupations or to determine the common elements among the various jobs within nonfarm agriculturally-oriented businesses.

Several studies used analysis of variance techniques in an attempt to identify common and differentiated competencies and activities. Results of studies using this technique of analysis indicate that the procedure accentuates differences but is inadequate for identifying the common components among the various occupations. Courtney (1962), testing the hypothesis that three means were equal, reported that in a majority of cases the hypotheses were rejected, thereby indicating a lack of common components among occupations. However, when comparisons of pairs of means were made, a number of common components were found between farmers and grain elevator managers, between farmers and farm real-estate brokers, and between grain elevator managers and farm real-estate brokers. Fiscus (1965) and Dillon (1965) used analysis of variance techniques with the result that most of their null hypotheses were rejected, an indication of lack of common elements among occupations or among jobs within a type of business. In each case, the investigator had to resort to more elementary descriptive statistics, mean scores or proportion of responses, as a basis for recommending curriculum content.

Albracht (1966) used chi-square techniques to determine whether or not the responses of four sub-juries were significantly different. He used the McQuitty Heirarchial Classification System to cluster the responses of the jury of experts. He reported that the McQuitty Heirarchial Classification System grouped the responses regarding the essentiality of 40 competencies for the performance of sales activities in the feed industry into three sub-groups with nearly equal representation for each of the sub-juries, thereby indicating a very high level of agreement among the jury of experts.

Factor analysis has been used as a method of grouping or clustering of activities and competencies. The process of factor analysis as applied to curriculum development in agricultural education was described by G. R. Fuller (1965a). Phipps _et al_. (1964), using factor analysis, identified 12 activity factors and 12 knowledge-area factors around which job titles were clustered for purposes of curriculum development. Stevenson (1965) identified eight competency factors in nonfarm agricultural occupations through techniques of factor analysis. R. A. Baker (1966) and Hoover, McClay, and Stevens (1966) identified clusters of occupations and clusters of competencies through the use of factor analysis.

Findings of Curriculum Research

Competencies needed by farmers.--Pearce (1964) found that farm management was the most important single area of educational need of beginning farm operators in New York. He urged that educational programs for farmers emphasize the decision-making process and include instruction pertaining to cost control, analysis of the farm business, the use of credit, improving farm efficiency, electricity, selecting and repairing farm machinery, soil management, the control of insects and weeds, and the efficient use of soil resources. In an earlier study, L. C. Taylor (1962) had emphasized that the process of decision making and its application should be taught in courses of study in vocational agriculture for high school pupils and for young farmers. Solstad (1963) conducted a study to determine the basis for a course of study in farm power and machinery. He concluded that the emphasis should be placed on the selection of machinery as well as on the repair and maintenance of farm machinery.

Lockwood (1964) studied the competencies needed by persons engaged in dairy farming in Iowa; Robinson (1964) investigated the competencies in farm machinery, maintenance needed by farmers in Iowa; Hoyt (1965) determined the competencies in livestock marketing needed by Iowa farmers; and Bennett (1965) submitted a questionnaire to outstanding young farmers in Iowa to determine the competencies needed in the areas of soil management and fertilizers. The findings of these studies emphasize the importance of instruction pertaining to the management of the farm business.

The central purpose of R. A. Baker's (1964) study was an appraisal of farm mechanics instruction for secondary school departments of vocational agriculture in Alabama. He concluded that (a) teachers should consider the opinions of farmers pertaining to the appropriateness of the farm mechanics activities to be included in the curriculum, (b) curriculums in farm mechanics should be planned, revised, and evaluated in terms of the mechanical activities being performed on farms, (c) more emphasis should be placed on the managerial aspects of farm mechanics, and (d) more emphasis should be placed on the teaching of mechanical theory as well as on the teaching of manipulative skills.

Competencies needed by workers in nonfarm agricultural occupations.--As indicated earlier, numerous studies have been conducted to determine the competencies needed by workers in nonfarm agriculturally-oriented businesses. A summary of the findings of this research prepared at The Center for Research and Leadership Development in Vocational and Technical Education (1965e) at The Ohio State University included these conclusions: (a) the agricultural competencies needed by workers in the nonfarm businesses are determined primarily by the products handled by the business; (b) competencies relating to salesmanship, human relations, and business management are needed by employers in the nonfarm businesses; and (c) much of the agricultural content taught persons who are preparing for work in production agriculture is needed by persons who are preparing to enter the nonfarm agricultural occupations.

Phipps et al. (1964) found that technicians and other workers in nonfarm business and industrial firms in rural areas needed competencies in plant and soil science, animal science, agricultural economics, agricultural power and machinery, electricity, soil and water management, and agricultural chemicals. Employers indicated also that workers needed knowledge pertaining to credit, business principles, accounting, salesmanship, and office procedures. The study (Phipps et al., 1964) reported clusters of job titles which were related closely to the knowledge-area factors and activity factors identified in the study.

Using factor analysis, Hoover, McClay, and Stevens (1966) resolved a list of 60 competencies into 11 factors that could be translated readily into major areas of instruction for courses oriented toward employment in nonfarm agricultural occupations. The clusters of competencies needed by workers in the nonfarm agriculturally-oriented businesses were animal science, plant science, agricultural mechanics, agricultural business management, business management and economics, sales and business skills, job and employee characteristics, employee-supervisor relations, construction technology, industrial mechanics, and quality control. The study (Hoover, McClay, and Stevens, 1966) revealed that the competency factors in agriculture, business, and distribution correlated highly with the clusters of job titles identified. The clusters of job titles identified were the occupational areas of agricultural supplies, agricultural mechanics, ornamental horticulture, forestry, and food products.

Stevenson (1965) identified the following groups of competencies needed by workers in nonfarm agriculturally-oriented businesses: plant and soil science, animal science, agricultural business management, agricultural power and machinery, construction technology, human relations, salesmanship, and business management. Baker (1966) reported a similar list of clusters of competencies needed by workers in nonfarm agricultural occupations.

Fiscus (1965) reported that workers in farming, in grain elevator businesses, and in agricultural equipment businesses needed different knowledges in the seven agricultural knowledge areas investigated. However, there were sufficient knowledges which were common for all workers to warrant the development of instructional units for courses at the high school level in which prospective workers in all three businesses could be enrolled. Courtney (1962) found common components in job activities between farmers and grain elevator managers, between farmers and farm real-estate brokers, and between grain elevator managers and farm real-estate brokers. Dillon (1965) discovered that there was considerable similarity in the knowledge needed by workers in comparable job titles in licensed nurseries and in licensed ornamental horticulture businesses.

The series of studies conducted at Iowa State University to determine the competencies needed by workers in selected nonfarm agriculturally-oriented businesses provided extensive data for use in curriculum development. Studies were conducted to determine the competencies needed by workers in retail farm machinery distribution (Kahler, 1964), retail feed distribution (Hamilton, 1964), county elevator grain marketing (Mabon, 1964), and retail fertilizer distribution (Van Loh, 1964). This series of studies indicates clearly that many of the competencies needed by managers and workers in nonfarm agriculturally-oriented businesses parallel closely competencies in animal science, plant science, agricultural mechanics, and farm management needed by farmers.

The curriculum research reported was concerned primarily with occupational analysis as the basis for determining subject-matter content. Research of this nature is essential. However, it is not sufficient to answer other questions which are relevant. Questions pertaining to sequence of subject-matter, the level at which subject-matter is taught, organization and structure of content, the amount of time needed to teach the various subject-matter areas, and curriculum evaluation are problems to which subsequent research should be directed.

EDUCATIONAL PROGRAMS

Nonvocational and General Education

Programs of agricultural education of a general, prevocational, or nonvocational nature are not offered widely in the United States. Research in this area of agricultural education has been scant.

The U.S. Office of Education (1965) reported that 37,800 pupils were enrolled in general or nonvocational courses in agriculture in the public secondary schools in the United States during the 1960-61 school year. For each pupil enrolled in a general or nonvocational course in agriculture during 1960-61, there were approximately 12 pupils enrolled in courses in vocational education in agriculture in the public secondary schools during the same year. General or nonvocational courses in agriculture were offered in approximately four per cent of the public secondary schools in 42 states during 1960-61. During the same year, 11 states reported that instruction in agriculture was offered to seventh- and eighth-grade pupils. A total of 2,700 seventh- and eighth-grade pupils received instruction in agriculture in 1960-61.

Heimlich (1964) reported that only 21 of the 1,083 public high schools in Ohio offered programs of nonvocational education in agriculture during the 1963-64 school year. His investigation revealed that the primary purpose of the nonvocational program was to develop an understanding and appreciation of conservation, horticulture, and general agriculture. Al-Salman's (1965) study of the program of prevocational education in agriculture in the State of New York revealed that the three most important objectives for prevocational education in agriculture listed by a jury were (a) to acquaint pupils with career possibilities, agricultural problems, and sources of information, (b) to provide opportunities to explore the extent and importance of farming and other agricultural occupations in a community, and (c) to develop an understanding and appreciation for the importance of agriculture to producers and consumers. He reported that jury members and teachers of agriculture ranked the areas of orientation and guidance and conservation of natural resources as the most important areas of instruction for a course designed to accomplish the purposes indicated.

Vocational Education in Agriculture for High School Pupils

Latest available data concerning enrollment in agricultural education which are published by the U.S. Office of Education (1964) indicated that 488,624 high school pupils were enrolled in courses of vocational education in agriculture in public secondary schools in the United States during the 1962-63 school year. The number of pupils enrolled in 1962-63 was five per cent greater than the number enrolled in 1959-60. Vocational instruction in agriculture was offered in 9,132 secondary schools in the United States in 1962-63. As indicated previously, the number of pupils enrolled in vocational agriculture in the secondary schools is inadequate when compared to the number of persons needed for entry into farming and for employment in nonfarm occupations involving knowledge and skill in agriculture.

Instructional programs of vocational education in agriculture have been organized generally on what is termed a "cross-sectional" or "integrated" basis rather than in terms of separate subjects such as agronomy, animal science, and agricultural mechanics (Hamlin and Deyoe, 1950; Sledge, 1960). However, an emerging trend in programs of vocational education in agriculture is that of specialized courses, particularly for 11th- and 12th-grade pupils. Zurbrick (1965) queried teacher educators in agriculture in 39 states to ascertain their opinions concerning the value of specialized courses in vocational education in agriculture and to identify the specialized courses offered or planned in each of the states. He found that specialized courses in vocational education in agriculture were being developed in 29 of the 39 states. The specialized courses offered most frequently were agricultural mechanics, horticulture and ornamental horticulture, and agricultural business. Zurbrick's study showed that teacher educators in agriculture were in agreement with the concept of program development which utilizes specialized courses for third- and fourth-year high school pupils following basic instruction in agricultural science and occupational exploration for first- and second-year students. Beard (1965) found that teachers of agriculture preferred a course on introduction to agricultural occupations followed by occupational speciality courses in contrast to the traditional organization of courses consisting of vocational agriculture I, II, III, and IV.

The point of view appears to be rather generally accepted that introductory courses in agriculture should emphasize the basic principles of plant science, animal science, soil science, and related mechanics and familiarize pupils with the occupational opportunities in agriculture. This plan of organization for educational programs in vocational education in agriculture is an outgrowth of the research which has indicated agricultural knowledges and skills applicable to the wide range of occupations, both farm and nonfarm, requiring competencies in agricultural subjects. Specialized instruction in agriculture is being offered in the last two years of high school and, in several states, in programs of technical education in agriculture conducted in post-high school institutions. An accessory facet of the emerging concept of specialization in agricultural education at the 11th- and 12th-grade levels is the assignment of titles to courses which indicate content. For example, basic agriculture, agricultural science, agricultural mechanics, or agricultural business, are in contrast to the more traditional course titles of vocational agriculture I, II, III, and IV.

The controversy concerning educational programs for high school pupils which accentuate courses in general vocational education rather than vocational courses in the various areas of occupational speciality should be examined closely by the researcher in agricultural education. The identification of general competencies which are common to all occupations is not sufficient justification for the establishment of a common curriculum. Other relevant facets of the issue, to which research should be addressed, are the interests and motivation of pupils as they relate to the development of general abilities, the value of homogeneous grouping on the basis of occupational interest and background, and the magnitude and extensiveness of the transfer of learning of general abilities and competencies.

Research in program development in vocational education in agriculture for high school pupils during the first half of the current decade has centered upon the development of experimental, pilot, and demonstration programs. Innovations in programs of vocational education in agriculture resulting from the broadened purposes of agricultural education incorporated into the Vocational Education Act of 1963 have been concerned chiefly with programs designed to prepare for employment and advancement in the nonfarm occupations involving knowledge and skill in agricultural subjects. Clary (1964a) and Phipps (1965b) have indicated guides for establishing pilot programs in agricultural education.

Clark's (1963) study of a pilot program in Michigan was one of the first efforts to develop and evaluate a program designed specifically for high school pupils interested in the nonfarm businesses and industries. A pilot program in agricultural distribution conducted in Virginia was described by Wilson and Witten (1965). Hoover and Weyant (1965) described a pilot study involving 25 Pennsylvania high schools. Hemp, Phipps, Warmbrod, Ehresman, and McMillion (1966) evaluated pilot programs in Illinois which had as their main focus innovations in educational programs for high school pupils who were preparing for gainful employment in both farm and nonfarm occupations. The report of this two-year study (Hemp et al., 1966) included a comprehensive list of guidelines and suggestions for planning and conducting programs in agricultural occupations for high school pupils. Binkley (1965b), drawing upon the results of pilot programs in Kentucky, developed an excellent guide for use in planning, conducting, and evaluating programs in nonfarm agricultural occupations.

The use of pilot, experimental, and demonstration programs as a means of developing, evaluating, and implementing educational programs is a new dimension in agricultural education. Researchers should continue to use and refine this technique of program innovation and evaluation. A perusal of research currently being conducted under the provisions of the Vocational Education Act of 1963 revealed two significant studies pertaining to the development and evaluation of programs of vocational education in agriculture for high school pupils. A project being conducted at the University of Nebraska has as its purpose the experimental evaluation of approaches to preparing high school pupils for agricultural occupations other than farming. The Nebraska study is designed to assess the effects of the following variables on the preparation of high school pupils for initial entry into agricultural occupations: related instruction pertaining to occupational proficiency; practical, on-job directed experience; years of instruction in vocational agriculture; and principles-oriented versus problem-oriented organization of instruction. A study being conducted at Louisiana State University has as a major objective the development of training programs for high school pupils whose occupational objective is employment in nonfarm agricultural occupations.

The program and activities of the Future Farmers of America, the organization of high school pupils enrolled in vocational agriculture, is recognized as an integral part of the program of vocational education in agriculture. Research pertaining to the FFA has been primarily descriptive in nature. The most frequently researched aspect of the FFA has been the contest and award programs. Hemp (1961) analyzed the FFA and vocational agriculture contest and award programs in Illinois. He found that although teachers rated many of the contests and awards high in educational value, a majority of teachers were of the opinion that some contests should be revised or eliminated. Hemp's (1961) study disclosed that less than one-half of the 12th-grade pupils included in his study had participated in six of the seven contest and award programs which he investigated at the local, district, or state levels. Seniors who had won an award in a particular activity rated that activity higher in educational value than did pupils who had not won an award. Wilkins (1965), studying the accomplishments of chapter award winners at the national level, found a majority of the objective standards established for the national contest failed to discriminate in the selection of national winners but subjective, descriptive reports were highly discriminating in the selection of winners of national awards. Kantner (1965) solicited ideas concerning the adaptation of the FFA to the changing program of vocational education in agriculture from state supervisors of vocational agriculture, teacher educators, teachers of agriculture, and school administrators. The study resulted in a revised list of purposes for the FFA and in the addition of activities appropriate for pupils enrolled in programs of instruction oriented toward employment in nonfarm agricultural occupations.

Additional research pertaining to the role and value of student organizations as a part of the program of vocational education in agriculture is needed. Particularly appropriate are evaluative studies leading to new and revised programs and activities which are in keeping with the broadened objectives of vocational and technical education in agriculture. Investigations designed to identify and measure the educational outcomes of the programs and activities of student organizations should receive high priority.

Technical Education

Technical education in agriculture is a rapidly-developing area of agricultural education. This movement, which has emerged prominently during the present decade, was given impetus with the enactment of the Vocational Education Act of 1963. Technical education in agriculture is offered usually in post-high school institutions. In an early study conducted under the provisions of the National Defense Education Act, Halterman (1962) sought to establish a definition for the term "agricultural technician" and to determine the need for technicians in agriculture in California. He identified the following distinguishing characteristics of an agricultural technician: (a) an extended period of specialized education beyond high school, less than that required for a baccalaureate degree, in the field of agricultural science and related areas of instruction; and (b) the acquisition of skill and ability to make practical applications of theoretical knowledge in performing specific tasks in the production of goods and services in agriculture. In a subsequent investigation, Halterman (1964) concluded that programs of technical education in agriculture should emphasize the development of technical and cognitive skill in contrast to manipulative skill.

Halterman (1962) found that the number of technical positions in agriculture was large and identified the following groups of technical workers in the agricultural manpower force in California: veterinary, public service, sales-service, field production, research, laboratory, industrial production, engineering, communications, business, and landscape and nursery. Phipps et al. (1964) found that nine per cent of all workers in business and industrial firms in rural areas of Illinois were working as technicians or in jobs requiring some post-high school technical education. Rural areas were defined as areas with population centers of less than 25,000 persons. Phipps et al. (1964) reported that employers estimated that growth of business firms during the next five years would create a demand for a 31 per cent increase in the number of technicians and other workers who need technical knowledge. Employment needs during a 12-month period to meet demands for workers created by growth of businesses and turnover of employees was reported, in the Illinois study, to be 17 per cent of the number of technicians and other workers needing technical knowledge who were employed at the time the study was conducted. Halterman's (1964) study of the needs of agricultural engineering technicians in Ohio revealed that the availability of additional qualified workers and the adequate education of present employees constituted the major problems of employers. Vorhies (1964) reported that there were 19 junior colleges in California offering instruction in agriculture in 1963. However, he noted that most of the courses were offered for transfer credit to four-year institutions rather than as a part of terminal curriculums. Vorhies found that agricultural technicians programs which were terminal in nature had been initiated in two junior colleges and in three of the four-year colleges in California.

Snepp (1963), investigating the agricultural offerings in community colleges in the United States during 1962-63, reported that agriculture was listed as a curriculum offering in 30 per cent of the public junior colleges included in the sample. Fifty-five per cent of the students enrolled in agricultural programs in the junior colleges studied by Snepp were enrolled in vocational and technical curriculums which were terminal in nature. Clary (1964b) identified 25 institutions in the United States offering training programs for agricultural technicians. Twelve of the agricultural technician programs were offered in technical institutes, 11 of the programs were offered in public junior colleges or comprehensive community colleges, and two of the programs were offered in area vocational and technical schools. Clary reported that the 25 institutions were offering 59 different training programs for agricultural technicians in the areas of agricultural engineering, plant science, forestry, and general agricultural technology. An indication of the recency of the development of technical education in agriculture is Clary's (1964b) finding that 19 of the 59 technical programs were initiated in 1963. Also, he reported that 28 state directors of vocational education indicated that definite plans were being made for the development within the next five years of new or additional training programs for agricultural technicians.

Technical curriculums in agriculture to be offered in post-high institutions have been developed for agricultural supply technicians (G. R. Fuller, 1965b), for agricultural engineering technicians (Halterman, 1964), and for animal science technicians (J. K. Baker, 1965). W. S. Stone of the State University of New York, Delhi, New York, is currently conducting a project, funded by the U.S. Office of Education, which has as its purpose the developing and evaluating of curriculums for the technical occupations ancillary to the veterinary, biological, and medical professions. E. S. Wood of Southern Illinois University is currently engaged in a project designed to evaluate the programs of technical education in agriculture conducted in junior colleges and community colleges in Illinois.

Adult and Continuing Education

The most recently published data of the U.S. Office of Education (1964) indicate that 339,203 persons were enrolled during 1962-63 in adult preparatory and supplementary programs of vocational education in agriculture in the United States. Enrollment during 1962-63 was approximately two per cent more than in 1959-60. During 1962-63, 2,492 public secondary schools offered adult preparatory programs of vocational education in agriculture; 5,994 public secondary schools offered adult supplementary programs. The Panel of Consultants on Vocational Education (1963) reported a national average of 3.6 persons enrolled in adult programs of vocational education in agriculture during 1960-61 for each 1,000 persons in the population, 20-64 years of age.

A multitude of studies has established convincingly the need for continuing education in agriculture for persons employed in both farm and nonfarm occupations. Lockwood (1964) discovered that dairy farmers in Iowa felt they possessed significantly less competence than they needed in all competency areas investigated. Bennett (1965) concluded that the need for additional training for farm operators is evident when the outstanding group of Iowa farmers which he studied indicated a need for more competence than they possessed in almost all competency areas. Tugend (1964) found that two-thirds of a sample of successful farm operators in Maryland who were not performing mechanical skills needed on their farms indicated they were not trained to perform the skills. Jensen's (1961) survey of 2,464 Wisconsin farmers concerning attitudes toward training for the performance of mechanical skills revealed that more than 50 per cent of the respondents expressed a need for training in 95 of the 143 mechanical skills that were investigated. Pearce (1964), investigating the establishment of young farmers in New York, concluded there was a need for programs of instruction in agriculture for beginning farm operators to achieve establishment in farming. Rodgers (1961) reported that part-time young farmers in Ohio identified a lack of management ability and a lack of mechanical skills as major difficulties which were encountered.

The need for supplementary instruction for workers possessing knowledge and skill in agriculture who are employed in nonfarm occupations has been established. The studies by Hamilton (1964), Kahler (1964), and Van Loh (1964) concerning feed, farm machinery, and fertilizer businesses in Iowa revealed that employers and employees indicated a need for greater competence in all competency areas that were investigated. Other investigators have reported that employers expressed an interest in training programs to upgrade the performance of workers in nonfarm agriculturally-oriented businesses (Judge, 1965; Morrison, 1964).

Several studies have been reported that are descriptive in nature; for example, the process of establishment in farming, types of programs offered, and the characteristics of persons enrolled. Another group of studies has focused on the identification of factors that are associated with successful programs of adult education in agriculture.

Lester (1961), in a study of 100 farm operators in Missouri, identified the pattern most frequently followed in becoming established in farming to be (a) father-son partnership, (b) share tenant, and (c) owner or owner-renter. He found, however, that it was not uncommon for farmers to by-pass the status of share tenant and become an owner directly from a father-son partnership. Pearce (1964) found that New York farmers no longer followed the traditional agricultural ladder in becoming established in farming. He discovered that farmers often began working for agricultural wages and then attained ownership status. Many farmers began farming as owners or partners. Holt's (1962) study to ascertain the influence of adult farmer courses taught by specialists of the state education agency on the programs of adult education conducted by teachers of agriculture in Texas revealed that the courses taught by specialists stimulated the development of additional programs of adult farmer education in the local schools. He found, however, that farmers and ranchers preferred courses taught by the teacher of agriculture to any other type of training.

Research has established rather conclusively that certain characteristics of farmers such as educational level, farming status, size of farm operated, investment in farming and gross income, and participation in community affairs are associated significantly with enrollment and attendance in programs of adult education. Rodger's (1961) study of part-time young farmers who were enrolled and part-time young farmers who were not enrolled in programs of adult education revealed that the young farmers who were enrolled had more formal education, kept more records of their farming operations, had larger investments in farming, and received more income from nonfarm employment than young farmers who were not enrolled. Well (1965) found that farmers participating in programs of adult education were younger, had more formal education, received a higher gross income, had larger farms, read more agricultural literature, and were more active in community organizations than nonparticipants. Flood's (1964) analysis of adult farmer courses conducted in Arkansas during 1961-62 revealed that there was a positive relationship between enrollment in courses and the educational attainment of farmers and that full-time and part-time farmers attended classes more regularly than farm laborers and persons employed in nonfarm agricultural occupations. Other factors which have been identified as conducive to successful programs of agricultural education for adult farmers are (a) active participation by farmers in determining the content of the course, (b) methods of teaching which emphasize discussion of the problems of farmers in contrast to the lecture method of teaching, and (c) on-farm instruction as an integral part of the instructional program (Davis, 1961; Flood, 1964). Of special significance is the finding of Flood (1964) that teachers of vocational agriculture were significantly more effective in maintaining attendance in adult farmer courses than were special instructors.

As a subsequent section pertaining to learning processes and teaching methods will indicate, there is a scarcity of experimental research relating to teaching and learning processes applicable to adult education in agriculture. Researchers in agricultural education have been reluctant to undertake studies which investigate the behavioristic change of participants in programs of adult education in agriculture. The vast amount of research pertaining to the diffusion process and to the adoption of recommended farm practices has been designed and executed by rural sociologists, not agricultural educators. Research is needed that relates to the development and evaluation of programs of adult and continuing education for persons currently employed in the nonfarm agriculturally-oriented sector of business and industry. Wood (1966) described a course taught successfully by a teacher of agriculture in Illinois which was planned especially for businessmen and professional workers who had an interest in and need for knowledge in agriculture. Interestingly enough, only one of the 16 businessmen enrolled in the course had studied vocational agriculture in high school.

Agricultural Education for the Disadvantaged

The implication of the research pertaining to adult and continuing education in agriculture is clear. Present programs of adult education are not reaching a substantial number of farmers who could profit most from such instruction; that is, farmers who do not possess the characteristics usually associated with participation in programs of adult education. It appears appropriate, then, that programs of adult education in agriculture be developed for unemployed and underemployed agricultural workers under the provisions of the Manpower Development and Training Act enacted by the U.S. Congress in 1962 and the Area Redevelopment Act which was enacted one year earlier. Programs of agricultural education conducted under the provisions of these acts have been few in number.

Statistics of the U.S. Department of Labor (1965) indicating enrollments in Manpower Development and Training Act programs in 1964 revealed that 5,270 trainees were enrolled in institutional and on-the-job training projects categorized as agricultural. Occupations classified as agricultural are those occupations pertaining to production agriculture. Data compiled by the U.S. Department of Labor (1966) indicated that 4.4 per cent of the 105,733 trainees authorized for MDTA institutional training during 1965 were receiving training in production agriculture. Kuykendall (1966) described a farm management program conducted in Tennessee under the provisions of the Manpower Development and Training Act. He reported that the average net worth of the 20 farm operators enrolled in the program increased by more than $3,000 during the two-year training period. Kuntz and Edington (1965) reported that 16 farm mechanics training schools were conducted in Oklahoma during 1962 and 1963 under the Area Redevelopment Act. Two hundred fifty-five men, most of whom were high school dropouts, received training in these schools.

The Vocational Education Act of 1963 has given impetus to research pertaining to the economically and socially disadvantaged. McMillion (1966) used a semantic differential instrument to ascertain the connotative meaning placed on certain words by enrollees in vocational agriculture and by teachers of vocational agriculture. McMillion found that a different connotative meaning was placed on the words "leadership" and "cooperation" by groups of pupils clasified by socio-economic level. Teachers were more in agreement with junior and senior pupils concerning the connotative meaning of the words and phrases than they were with freshmen and sophomore pupils. Hayes (1966), using a posttest-only control group design, studied the level of reading comprehension of three socio-economic groups of ninth-grade pupils of vocational agriculture to ascertain experimentally whether or not the pupils' levels of reading comprehension changed with the reading difficulty of written materials. The control group received reference materials in the form in which they were originally written for high school pupils. The experimental group received the same content which was rewritten for easier reading. Hayes (1966) found that materials written for pupils from the lower socio-economic groups assisted pupils in all socio-economic groups receiving these materials to achieve significantly higher scores on a test involving recall of facts.

Additional research pertaining to the economically and socially disadvantaged will be forthcoming. Of special significance to research in agricultural education is the developmental and experimental project currently being conducted by Phipps and Fuller (1965) at the University of Illinois. The primary purpose of this project is to generate and evaluate a vocationally-oriented program that will bring about the full utilization of the present and potential capabilities of rural youth who are economically and socially handicapped.

Supervised Agricultural Experience Programs

Supervised practice has played an important role as an integral part of vocational education in agriculture both in programs for high school pupils and for adults. Traditionally, supervised experience programs in agriculture have taken the form of farming programs conducted on the home farms of the enrollees, whether high school pupils or adults, or the placement of high school pupils for work experience on farms. Research pertaining to the supervised practice aspect of agricultural education has been almost entirely descriptive in nature.

Numerous investigations have been made to determine procedures used by teachers of agriculture for aiding students in the development of farming programs, to determine the extent to which teachers provide on-farm instruction, to identify the difficulties encountered by teachers in establishing supervised experience programs, and to isolate the principles which should be followed in the establishment and operation of farm placement programs for high school pupils. Studies pertaining to supervised practice have been notorious in their reliance upon mailed questionnaires for collecting data.

Bentley and Scott (1961) sought to identify the teaching activities that were associated with the completion of a relatively high number of productive projects by enrollees in vocational agriculture. By surveying teachers of agriculture from schools where enrollees completed a relatively high number of projects and a group of teachers from schools where enrollees completed a relatively low number of projects, Bentley and Scott (1961) identified significant differences between the two groups of teachers in the activities which were emphasized in planning and conducting supervised agricultural experience programs for high school pupils. Teachers of agriculture who taught in schools where enrollees completed a relatively high number of productive projects gave special attention to farming program requirements expected of enrollees, worked closely with enrollees' parents in planning and conducting farming programs, related classroom instruction closely to the farming program activities of enrollees, and utilized advantageously the FFA and the awards program as means of motivating enrollees to complete farming programs.

Pearce (1964) concluded that the behavior of farmers could be changed by technical assistance visits. He suggested, however, that the instructional visits be carefully structured for maximum effectiveness. Moeckel (1960) identified the following practices as effective in conducting on-farm instructional visits with adult farmers: (a) maintain a list of potential farm visits to be made; (b) assist farmers in conducting experimental and demonstration plots; (c) analyze with farmers the application of classroom instruction; (d) analyze with farmers the records of the farm operation; (e) use local production standards to assist farmers in evaluating the level and efficiency of production; and (f) survey farmers during class sessions to determine their viewpoints concerning on-farm instruction.

Programs of supervised experience in agricultural education have been justified, philosophically and educationally, on the grounds that supervised practice motivates the learner, allows classroom instruction to be taught in a meaningful context, provides an opportunity for the application of what is taught, enables a student to learn by doing, and contributes to the development of general skills and attitudes toward work which are needed for employment in any occupation. Strangely enough, research growing out of these theoretical foundations and research designed to test these hypotheses concerning the values of supervised experience in agricultural education have been meager.

One facet of Christensen's (1964) study was to determine empirically the effect differences in enrollees' supervised farming programs had upon acquisition and retention of learning. The salient findings pertaining to the features of supervised farming programs which influence classroom achievement in vocational agriculture were: (a) ownership by the enrollee of one animal of the type being studied in the classroom was of benefit only in situations where there were none of the animals of the type being studied on the home farm; (b) for the livestock experience program to measurably influence classroom learning, the scope of the enterprise had to be large enough to require managerial skills; (c) the amount of first-hand experience by the enrollee with the topic being discussed in the class had greater influence on acquisition than on retention; and (d) prior experience was more influential upon gain in facts and figures than upon the learning of either scientific principles or ability to solve problems. Judge (1963) investigated the relationship between work experiences of high school pupils of vocational agriculture and their occupational and educational plans and aspirations. Judge found that increased amounts of farm work experience, including experience with projects owned by the pupil, were related to a choice of agricultural occupations in preference to nonagricultural occupations, to the choice of farming in preference to nonfarm agricultural occupations, and to higher levels of occupational aspiration.

The development of instructional programs oriented toward employment and advancement in the nonfarm occupations involving knowledge and skill in agriculture has led to investigations concerning supervised occupational experience in business and industry. Anderson (1966) surveyed some 300 teachers of agriculture, distributive education, and trade and industrial education in several states with the request that they rate in terms of importance a series of activities and procedures which appeared to be applicable to the planning and conducting of supervised occupational experience programs in nonfarm agriculturally-oriented businesses. Anderson listed 18 guidelines which were rated important in planning and conducting supervised occupational experience programs for enrollees preparing for employment in nonfarm agricultural occupations.

Research supported by the U.S. Office of Education is currently under way which should make substantial contributions to the theory and practice of supervised occupational experience in agricultural education. An intricately-designed study is being conducted at the University of Nebraska to evaluate approaches of preparing high school pupils for agricultural occupations other than farming. One facet of this experimental study is designed specifically to assess the effects of practical, on-job directed experience in the preparation of high school pupils for initial entry into the nonfarm occupations involving knowledge and skill in agriculture. Cushman is directing a project at Cornell University which is designed to develop and evaluate procedures for use by teachers in directing work experience programs in vocational education in agriculture. Pilot centers in the northeastern states will be used to field-test the materials prepared and to evaluate the effectiveness of the procedures developed.

The projects mentioned in the preceding paragraph are prototypes of the dimensions which should be emphasized in research pertaining to supervised experience programs in agricultural education. Promising practices and procedures, identified through descriptive studies, should be evaluated rigorously in terms of their contribution to learning, motivation of pupils, and the development of attitudes and abilities essential for employment and effective citizenship. The total gamut of possible supervised practice activities--farming programs, placement for farm experience, school laboratory experience, self-employment, and occupational experience in business and industry--are areas for investigation. Researchers in agricultural education should give special attention to supervised occupational experience as it relates to programs of post-high school technical education in agriculture.

INSTRUCTIONAL MATERIALS AND DEVICES

Recent developments in agricultural education relative to instructional materials and devices may be classified into three major categories: the development and evaluation of programed instructional materials; the evaluation of other types of instructional materials through experimentation on methods of teaching or, in some cases, experiments designed specifically to evaluate instructional materials; and the development of instructional materials as a result of the current research relating to the development and evaluation of educational programs oriented toward the nonfarm agricultural occupations.

Agricultural textbooks have been used as important sources of reference materials for enrollees in vocational agriculture courses. Galloway (1960) compared the readability of agricultural reference books used widely in vocational agriculture with the reading ability of the enrollees using the books. Generally, he found that the reference books tended to be too difficult for the reading ability of the enrollees. The research reviewed in the subsequent section on learning processes and teaching methods revealed that a variety of instructional materials and devices have been evaluated in studies which were designed primarily to evaluate the effectiveness of methods of teaching. Programed instructional materials have been compared with conventional forms of student reference materials, a branching program has been compared to a nonbranching program, and scrambled books, laboratory exercises, and teaching plans have been subjected to experimentation.

Experimental studies designed specifically to evaluate the effectiveness of instructional materials have not been common in agricultural education. Daugherty (1965) field-tested a teaching plan and handbook for students which had been developed for teaching beef marketing to young farmers. Following an 18-hour course of instruction extending over a period of six weeks, he found that the young farmers scored significantly higher on an achievement test than they scored on a pretest administered at the beginning of the training period. Also, there was a significant difference between the number of recommended marketing practices used by young farmers at the end of the course than the number of practices used at the beginning of the course. The design of Daugherty's study, the one-group pretest-posttest design, does not control or account for extraneous variables which offer plausible alternative hypotheses relating to a pretest-posttest difference in scores on the criterion measures. Hence, the conclusion that the instructional materials evaluated in the study were effective in teaching beef marketing to young farmers cannot be accepted without qualification.

Ehresman (1966) examined the effectiveness of a structured source unit which was designed to assist teachers in organizing and teaching a unit on agricultural cooperatives to high school pupils. The effectiveness of the experimental variable was determined by testing pupils' knowledge of agricultural cooperatives at the close of the unit of instruction. The study involved a pretest-posttest control group design with 10 schools assigned randomly to both the experimental group and the control group. Teachers in the experimental group were given the source unit for their use; teachers in the control group did not have access to the source unit in teaching the unit on agricultural cooperatives. No significant difference was found in the mean posttest scores of pupils taught by teachers in the experimental group and the mean posttest scores of pupils taught by teachers in the control group. Ehresman (1966) suggested that maximum benefits may not be derived from structured instructional materials for use by teachers unless teachers are given assistance in using the materials.

A recent trend in agricultural education is research which has as its primary purpose the development of instructional materials. Sutherland (1962) conducted a project under the provisions of the National Defense Education Act which resulted in a publication to aid teachers of agriculture, through an inductive approach to teaching, in relating agricultural practices to the underlying principles of biology. One outcome of a pilot program conducted in Kentucky was the development of instructional materials for use by teachers in planning and teaching high school courses designed for pupils who are preparing to enter sales and service occupations in agricultural supply businesses (Binkley, 1965a). Under a grant from the Bureau of Adult and Vocational Research, U.S. Office of Education, instructional materials pertaining to horticulture, agricultural supply, agricultural machinery, and agricultural chemical technology have been prepared by a task force at The Ohio State University under the sponsorship of The Center for Research and Leadership Development in

Vocational and Technical Education (1965a, 1965b, 1965c, 1965d). These instructional materials are intended for use in high school programs of vocational education and in post-high school programs of technical education in agriculture.

Several projects currently funded under the provisions of section 4(c) of the Vocational Education Act of 1963 have as a major purpose the development of instructional materials for use in programs of vocational and technical education in agriculture. Brown and Love (1965) described a current project that has as its main purpose the development and evaluation of instructional units in ornamental nursery, floriculture, and turf occupations for high school pupils and adults. The development and evaluation of instructional materials, laboratory exercises, and reference materials in the area of ornamental horticulture are major activities of a current project directed by Hemp at the University of Illinois. The project involves field-testing of the instructional materials developed and the upgrading of the competency of teachers in the area of ornamental horticulture through an institute held during the summer of 1966.

The annual publications of the Professional Information Committee of the Agriculture Division, American Vocational Association (1965), should be consulted for a current list and description of instructional materials in agricultural education.

LEARNING PROCESSES AND TEACHING METHODS

Christensen's (1964) study of the factors influencing acquisition and retention of learning in vocational agriculture stands as the singular piece of research pertaining directly to learning and learning processes in agricultural education. Using a pretest-posttest retention-test design, Christensen sought to determine the effect of individual differences, differences in home-farm situations, and differences in pupils' supervised farming programs on the ability to learn and retain facts and figures, to learn and retain scientific and technological information, and to learn and apply the techniques of problem solving. The salient findings of Christensen's study pertaining to the relationship of supervised experience and learning have been noted in the section dealing with supervised agricultural experience programs. Additional significant findings reported by Christensen (1964) were: (a) the level of occupational aspiration of students was related to ability and was an influential factor in learning; (b) aptitude had greater influence on total acquisition and retention than did any other factor investigated; (c) a direct relationship existed between the amounts acquired and retained and parental attitude toward the program of vocational education in agriculture in the school; (d) a good to excellent opportunity to farm appeared essential if the pupil was to approach maximum classroom learning and retention; (e) acquisition and retention of fact and figure information depended more upon prior experience than upon aptitude; (f) acquisition and retention of scientific and technological information depended more upon aptitude than upon prior knowledge or other experience factors; (g) problem solving ability, as measured in the study, depended more upon a pupil's level of aptitude than any other factor; (h) the largest measured gains of knowledge were made in facts and figures; and (i) the highest measured retention was of scientific and technological information and in problem solving ability.

In another study relating to learning processes, Hull (1965) developed and tested a factor analysis procedure for sequencing self-instructional materials pertaining to concept attainment. The experiment dealt with human relations concepts which employees in agricultural businesses need to know. In the first phase of the experiment, responses of pupils to self-instruction booklets that were randomly sequenced were factor analyzed to generate a psychological sequence of concepts. In the second phase of the experiment, the psychological sequence of concepts was compared with a random sequence. The study involved junior and senior high school enrollees in vocational agriculture. Reading comprehension test scores were used as controls in an analysis of covariance design. Hull (1965) found that the psychological sequence did not result in significantly higher scores on the criterion posttest when all the data were considered. However, a detailed analysis of the data led Hull to conclude that the effect of sequence in instructional materials is specific to the achievement level of pupils and the difficulty level of the materials presented.

Experimentation relating to programed instruction in agricultural education has resulted in diverse findings. The research has not established programed instruction as superior to other methods of presenting subject matter; neither have the research findings indicated consistently a lack of effectiveness of programed instruction.

Dayger (1965) compared the effectivenss of a programed instructional unit on figuring board feet with a conventional method of teaching the same subject matter to high school pupils. Using the increase in mean scores between the pretest and the posttest as the criterion of effectivensss, Dayger concluded that the programed unit was as effective as the conventional method of teaching. Hanneman (1964), using a posttest-only control group design, found that pupils in the experimental group using programed instruction relating to parliamentary procedure scored significantly higher on the criterion test than pupils in the control group who did not have access to programed instruction. Zarraga (1963) investigated the effectiveness of a branching program versus a nonbranching program for teaching farm business management to 11th- and 12th-grade enrollees in vocational agriculture. The pretest-posttest design of the study allowed also an evaluation of the effectivensss of review examinations incorporated at the end of each unit of programed instruction. Zarraga (1963) found that learning had taken place in all experimental trials. The branching program with review examinations showed a slight advantage, although not statistically significant, over the branching program without review examinations. The branching program with review examinations was superior to the nonbranching program with review examinations. Zarraga's research indicated that programed instruction was effective for all ranges of ability of pupils.

Legg (1962) compared the effectiveness of programed instruction and lecture-discussion as methods of teaching agricultural finance to high school pupils and adult farmers. In addition to teaching method, other variables investigated were grade level of pupils and type of answer sheet, an erasure-feedback type of answer sheet versus the conventional multiple choice answer sheet. A multivariate pretest-posttest design was used with the criterion examination re-administered as a retest two months after the close of the experiment. When the amount of time for teaching the unit by each method was not controlled, Legg (1962) found that the mean posttest scores of pupils taught by the lecture-discussion method were significantly higher than the posttest scores of pupils taught with programed instructional materials. The mean scores for grade levels were significantly different both for the posttest and retest with ninth- and 10th-grade pupils receiving the lowest scores and adults receiving the highest scores. The retest scores of pupils who had previously used the erasure-feedback type of answer sheet were significantly higher than the scores of pupils who had used the conventional multiple choice answer sheet.

Hull and McClay (1965) reported that a replication of the experiment conducted by Legg revealed higher posttest scores for pupils taught by the lecture-discussion method. However, the scores were not significantly higher than the posttest scores of pupils who were taught by the programed instruction method. In the replicated experiment, the amount of time used for teaching the unit was controlled for each treatment.

Additional research pertaining to methods of teaching has been concerned with a variety of seemingly unrelated topics. Conceptional versus factual presentations of subject matter have been investigated; methods of teaching information about agricultural occupations have been studied; studies relating to the teaching of biological and plant science principles have been undertaken by two investigators; while the concern of other investigators has been the effectiveness of visual aids in the teaching process.

The effectiveness of conceptional and factual presentations of reading material for high school enrollees in vocational agriculture was appraised by Edgecomb (1961). The subject matter of the study dealt with quality milk production and the pretest-posttest design of the study allowed an evaluation not only of conceptual and factual presentations of subject matter but also for combinations of the two versions of reading material. Edgecomb (1961) reported that achievement of pupils was not significantly different among the methods of presentation. Achievement was greater, however, for 11th- and 12th-grade pupils than for ninth- and 10th-grade pupils.

Shontz (1963) compared the effectiveness of three methods of teaching information about agricultural occupations associated with land use and conservation. Subjects for the experiment were ninth- and 10th-grade enrollees in vocational agriculture. Teachers using an integrated method combined into one instructional unit information on agricultural occupations and land use and conservation. Teachers using the separate-units method taught separate units on agricultural occupations and land use and conservation. Teachers using their own method of teaching were furnished a list of titles of the problem areas in land use and conservation but were not furnished resource units pertaining to agricultural occupations. A pretest-posttest experimental design was used. Analysis of covariance, with scores on a standardized reading test and pretest scores on criterion measures as covariates, was used to test the hypotheses. Shontz (1963) found that the integrated and separate-units teaching methods did not differ significantly in pupil achievement on the agricultural occupations test or on the land use and conservation test. However, both were superior to the instructor's usual method of teaching. All methods resulted in increases in scores on expressed interests of pupils but had no generally consistent influence upon pupils' inventoried interests pertaining to five agricultural occupations associated with land use and conservation. Expressed interests of pupils and inventoried interests of pupils did not differ significantly among the three teaching methods investigated.

Drawbaugh (1963) studied the effectiveness of three kinds of plant-growing facilities and three teaching methods for teaching plant science principles. He found that achievement in plant science by pupils using school greenhouses was greater than it was for pupils using other facilities, community greenhouse or classroom window sills, for growing crops. Achievement in knowledge of plant science principles by pupils taught by the laboratory manual and functional experience methods was greater than achievement by pupils in schools where the teacher used his own method of teaching. Starling (1964) established that high school enrollees in vocational agriculture in schools where the teaching of biological principles was integrated with the teaching of agriculture showed significantly greater gains in achievement from pretest to posttest than enrollees in schools where the usual method of teaching agriculture was used.

Madison (1962) compared two methods of presenting farm management information to high school pupils. One group was presented a summary of farm management information using tables and numbers. The other group was presented the same information with data presented in the form of bar graphs. Comparing pretest and posttest scores on the criterion test, Madison found that learning had occurred in each group. However, there was no significant difference between the two methods of presentation of data. Bodenhamer (1964) found that voluntary adult audiences, presented an informative speech which was supplemented with visual aids, learned significantly more when tested for immediate recall than audiences given the same informative speech without visual aids.

The findings of research pertaining to learning processes and teaching methods do not provide, singularly or collectively, a basis for the development and refinement of theory and practice concerning teaching and learning in agricultural education. What is a plausible explanation for this lack of a "sense of direction" in this area of research? Research pertaining to teaching and learning is of necessity a long and arduous process. The development of a promising method or technique requires definition and refinement through experimentation and investigation prior to the time it is subjected to rigorous evaluation in an experimental setting. The development of criterion measures that are precise, valid, and reliable is an area of research all its own. Only after these tasks have been accomplished is it appropriate that the experimental evaluation of the proposed technique or method be conducted.

In the studies cited, an attempt was made to accomplish, within the domain of the study being undertaken, all three of these tasks: that is, refinement of the experimental treatment or treatments, development of criterion measures, and experimental evaluation of the proposed technique or method. Generally, researchers in agricultural education have done a commendable job with the third step, the design and execution of experimental studies. However, the diverse and inconsistent findings which were reported hint that more attention should be given to the development and refinement of experimental treatments and to the construction of valid and reliable criterion measures.

Unquestionably, the task calls for study and investigation over a period of time involving a series of related investigations from which will evolve theory and practice relating to teaching and learning. Such a result could hardly be expected from a series of unrelated studies such as those reviewed. Each of the studies cited was conducted by a graduate student. Investigators who are working toward an advanced degree encounter restrictions relative to time and financial resources which preclude the type of research relating to teaching and learning in agricultural education that is needed. Agricultural educators who are established in positions of research or teaching have been conspicuous in their neglect of this area of research.

The experimental designs used in studying methods of teaching have been, in most cases, either the pretest-posttest control group design or the posttest-only control group design. Both are currently recommended designs in the methodological literature in educational research. However, the designs do not permit the measurement of the Hawthorne effect (Phipps, 1962b), a consideration that should not be overlooked when an experimental method of teaching is compared to a conventional method of teaching which is characterized usually as a teacher's own method of teaching.

The design of many of the experiments permitted the simultaneous investigation of several independent variables as contrasted to the single variable approach. The multivariate analysis of data frequently involved analysis of covariance techniques with pretest scores on criterion tests and other appropriate measures used as covariates.

STUDENT PERSONNEL SERVICES

The research reviewed previously concerning manpower needs and employment opportunities indicated clearly that ample opportunities exist for employment both in farming occupations and the nonfarm occupations involving knowledge and skill in agricultural subjects. The research to be cited presently re-emphasizes the fact that many opportunities for employment await those persons receiving agricultural instruction in high school who desire to enter an agricultural occupation. The review of research which follows focuses on three main topics. Research will be presented pertaining to the characteristics of pupils studying agriculture in high schools, the educational aspirations and plans of these pupils, and the occupational plans and aspirations of enrollees in agricultural courses in high schools.

Characteristics of Pupils

A number of studies have been conducted which attempt to identify the characteristics of high school pupils enrolled in vocational education in agriculture. Enrollment in vocational education in agriculture has been limited almost exclusively to boys. Therefore, the discussion to follow will concern male enrollees only. Researchers have yet to turn their attention to a study of the characteristics of pupils enrolled in post-high school programs of technical education in agriculture.

Residential background.--The stereotype of the high school pupil of agriculture as a rural farm male is not substantiated. Bittner (1962) and Judge (1963) found that a majority of the boys studying agriculture in Michigan lived on farms. Drabick (1963) reported that 62 per cent of the male 12th-grade enrollees in vocational agriculture in North Carolina were from farms. Cooper, Jahns, and Cardozier (1965) also found that 62 per cent of the enrollees in vocational agriculture in Maryland were from farms of more than 10 acres. Benton (1960) discovered that only one-half of the boys enrolled in vocational agriculture from 1954 to 1959 in 16 counties in southern Illinois lived on full-time farms; the other one-half lived on part-time farms or in towns. Thompson (1963a) reported that 55 per cent of the enrollees in vocational agriculture in California whom he studied were living on farms. There has been, however, a more direct relationship between continued enrollment in agriculture and residence on a farm. This situation may change in the future because of the recent broadening of objectives of vocational education in agriculture to include training for nonfarm occupations involving knowledge and skill in agriculture. The percentage of junior and senior pupils enrolled in agriculture who live on farms is usually higher than the percentage of freshmen and sophomore pupils who live on farms (Bittner, 1962; Cooper et al., 1965).

The percentage of pupils whose fathers are full-time farmers is even lower than the percentage of pupils who live on a farm. Bittner (1962) and Judge (1963) reported that 35 per cent and 21 per cent, respectively, of the pupils whom they studied in Michigan were from full-time farms. Other studies revealed that about one-third of the fathers of pupils enrolled in agriculture were full-time farmers (Thompson, 1963a; Cooper et al., 1965).

The assumption has been made frequently that boys living on farms would have an interest in studying agriculture while boys living in town would have little, if any, interest in agriculture as an area of study. The findings concerning the residential backgrounds of pupils tend to negate this assumption. Walker (1962) conducted a study to construct an instrument for measuring the interests of eighth-grade boys concerning vocational agriculture. As a result of the investigation, the Pennsylvania Vocational Agriculture Interest Inventory was developed. Validation of the instrument indicated that successful enrollees in vocational agriculture could be reliably predicted from the score eighth-grade pupils obtained on the instrument.

Level of intelligence of pupils.--When comparisons of levels of intelligence are made between high school boys enrolled in vocational agriculture and high school boys not enrolled in vocational agriculture, the results consistently favor the pupils who are not enrolled in vocational agriculture. Drabick (1963) found that seniors enrolled in agriculture were disportionately represented in the lower intelligence quotient ranges. Cooper et al. (1965) reported that standardized test scores indicated a significantly lower level of intelligence and lower achievement in mathematics for pupils enrolled in agriculture when compared with the total male population of their grade.

The data indicate also that as the number of years of vocational agriculture completed by pupils increases, so does the percentage of pupils who are in the lower categories of intelligence (Bittner, 1962; Deyoe, 1961). Few differences have been found in the courses taken in high school, other than courses in agriculture, by pupils who were enrolled and not enrolled in agriculture. Deyoe (1961) reported that male graduates in Illinois who had taken vocational agriculture compared favorably with male graduates who had not taken vocational agriculture in the number of credits earned in English, social studies, and science. Graduates who had taken vocational agriculture tended to take fewer courses in mathematics than graduates who had not taken vocational agriculture. When male graduates entering college to study agriculture were considered, no significant differences were found between those studying agriculture in high school and those not studying agriculture in high school in the amount of English, mathematics, and science taken in high school (Alvis, 1964; Krebs, 1961).

Educational Aspirations and Plans of Pupils

Data indicating the percentage of pupils enrolled in agriculture who plan to continue their education beyond high school are variable. Bittner (1962) found that 30 per cent of the high school enrollees in vocational agriculture in Michigan planned to continue their education. Judge (1963) reported that approximately 20 per cent of the Michigan enrollees in vocational agriculture whom he studied indicated positively that they would continue their education. Drabick (1963) reported that 22 per cent of the seniors in classes of vocational agriculture in North Carolina expected to attend college. The study conducted in Maryland (Cooper et al., 1965) revealed that approximately 18 per cent of the enrollees in vocational agriculture planned to pursue some type of post-high school education. Contrarily, Thompson (1962b) found that 53 per cent of the juniors and seniors whom he studied in California had plans to continue their education beyond high school.

The research has established rather conclusively that enrollees in vocational education in agriculture both aspire to and plan to attend college in lesser proportions than do other male students in the school. Deyoe (1961) reported that a considerably smaller percentage of male graduates in Illinois who had taken vocational agriculture in high school expressed aspirations to enroll and actually did enroll in college than male graduates who did not take vocational agriculture in high school. Drabick (1963) reported similar findings from a study of seniors in North Carolina. Bittner (1962) found that only 12 per cent of the pupils who continued their enrollment in agriculture planned to continue their education while 35 per cent of the pupils who were enrolled in vocational agriculture at one time but transferred to other curriculums planned to complete some formal education beyond high school.

The relationship which has been established, indicating that enrollment in vocational education in agriculture is associated with a relatively lower percentage of pupils planning for and enrolling in some type of post-high school education, must be interpreted in light of another relationship which has been established. As reported previously, pupils with relatively lower levels of intelligence tend to enroll in and, more importantly, continue their enrollment in vocational education in agriculture. Since aspirations and plans for higher education are positively correlated with level of intelligence, the relationship which has been established between enrollment in vocational agriculture and plans for further education is not surprising nor unwarranted.

Investigations which attempt to identify and analyze factors influencing pupils to attend college and study agriculture emphasize the merits of instruction in agriculture in high school. Strait's (1963) comparison of students who were studying agriculture in college with students of similar background who were majoring in fields other than agriculture revealed the following factors as influential in a pupil's decision to study agriculture: (a) enrollment in vocational agriculture in high school, (b) an interest in an agricultural career, (c) the understanding that agriculture and farming are not synonymous, and (d) knowledge concerning the careers available to graduates with agricultural education. Freeh (1962) reported similar findings from his study of farm and nonfarm youth who were and were not studying agriculture in college. The studies of pupils enrolled in agriculture in college are rather consistent in indicating that, other than parents, the person most influential regarding their decision to attend college was their teacher of agriculture in high school (Bentley, 1963; Freeh, 1962).

Occupational Aspirations and Plans of Pupils

Studies reveal that most persons enrolled in vocational agriculture have made at least a tentative choice of a vocation. Seventy-six per cent of the pupils in Bittner's (1962) sample expressed an occupational choice. Judge (1963) reported that 74 per cent of the pupils included in his study had made a tentative choice of occupation.

Thompson (1962b) found that only 15 per cent of the juniors and seniors in his study indicated that they were undecided about their plans immediately after high school. However, Cooper et al. (1965) found that almost one-third of the seniors enrolled in vocational agriculture were undecided about their plans following high school. The studies reveal that about one-fifth of the pupils planned to enter military service upon graduation from high school.

When the vocational choices of enrollees in agriculture are categorized by occupational area, indications are that one-half or more of the pupils recording an occupational choice prefer an occupation involving knowledge and skill in agriculture. Judge (1963) reported that 50 per cent of the pupils in agricultural courses making an occupational choice indicated a preference for an agricultural occupation. Thirty-five per cent chose farming and 15 per cent chose a nonfarm agricultural occupation. Krebs (1959) reported that 61 per cent of a group of seniors in vocational agriculture in Illinois had made future plans within the field of agriculture either in farming, employment in a nonfarm agricultural occupation, or further education in agriculture. The research indicates that slightly more than one-third of the enrollees in vocational education in agriculture in high school express a desire to farm as their life's work. This finding is significant in view of the fact that many of the projections of the opportunities for young men to enter farming are based on the assumption that most, if not all, of the farm youth, whether studying vocational agriculture or not, desire to farm.

Some rather obvious relationships concerning occupational choice and enrollment in vocational agriculture have been identified.

Bittner (1962) found that more of the pupils continuing their enrollment in vocational agriculture named farming and other agricultural occupations as their choice of occupation than pupils who transferred to other curriculums. Bittner found also that the occupational choices of pupils re-enrolling in agriculture were more consistent with the pupils' level of aspiration than choices of pupils transferring to other curriculums. Judge (1963) reported that work experience on a farm increased the probability that a pupil would choose an agricultural occupation in preference to a nonagricultural occupation or that a pupil would choose farming in preference to a nonfarm agricultural occupation. A definite relationship has been established between the father's occupation and the son's choice of occupation. Pupils whose fathers were full-time farmers chose farming as their career more often than pupils whose fathers were part-time farmers or in another occupation (Cooper et al., 1965; Thompson, 1962b).

When compared with their contemporaries in other curriculums, enrollees in vocational agriculture aspire and plan to enter occupations of lesser prestige (Drabick, 1963). Bittner (1962) reported that pupils who transferred from vocational agriculture aspired to higher level occupations than pupils who continued their enrollment in vocational agriculture. This relationship between enrollment in vocational agriculture and level of occupational aspiration and choice could be anticipated in light of the relationship previously established between enrollment in vocational agriculture and pupils' level of intelligence. Since there is a positive relationship between level of intelligence and level of occupational aspiration, the finding that pupils enrolled in vocational agriculture tend to choose occupations of lesser prestige than pupils enrolled in other curriculums is to be expected.

Aldrich (1962) and Thompson (1963b) attempted to identify the characteristics of an occupation which enrollees in vocational agriculture consider important in choosing an occupation. Both investigators reported that the characteristic which was selected as the most important in choosing an occupation related to the enrollee's interest in the job. Generally, economic aspects of an occupation were rated by the enrollees as more important in their choice of an occupation than the noneconomic aspects of the occupation. Thompson (1963b) reported that enrollees in vocational agriculture who planned to attend college were more interested in jobs which permitted the expression of one's own ideas and in jobs which provided an opportunity to help others. Interestingly enough, Thompson found that pupils selecting careers in agriculture were significantly more interested in working independently than were pupils in any other group.

FACILITIES AND EQUIPMENT

The research in agricultural education relating to facilities and equipment has been primarily descriptive in nature. For example, surveys have been made of the facilities and equipment used in teaching agriculture; teachers of agriculture, supervisors of agricultural education, and teacher educators in agriculture have been asked to indicate what facilities, tools, and equipment should be made available for instruction in agriculture; and several studies have been made to ascertain what tools, equipment and supplies are used and needed for instruction in agricultural mechanics. Hollenberg (1959) reported the findings of a national survey which was designed to describe the status of agricultural mechanics shops and programs of instruction in vocational education in agriculture. The results of the questionnaire completed by teachers in 676 randomly selected schools throughout the United States indicated, among other things, the kind of facilities and equipment used for instruction in agricultural mechanics.

Drawbaugh's (1963) study of plant-growing facilities for teaching agriculture is the lone experimental investigation pertaining to this area of concern. Drawbaugh compared the effectiveness of the school greenhouse, community greenhouse, and classroom window sills as plant-growing facilities for teaching the principles of plant science. The design of the experiment also permitted the comparison of three methods of teaching. The methods of teaching investigated were laboratory manual, functional experience, and the teacher's own method. Drawbaugh (1963) found that the achievement in plant science by pupils using the school greenhouse facilities was greater than the achievement of pupils using the other facilities for growing plants. He found also that the knowledge of greenhouse management and principles of plant science attained by pupils taught by the laboratory manual and functional experience methods was greater than the knowledge attained by pupils taught by the teacher's own method.

TEACHER EDUCATION

Description and Appraisal of Programs of Teacher Education

Several investigations have had as a major purpose the description and appraisal of programs of teacher education in agriculture.

Jabro (1962) queried head teacher educators to collect descriptive data and information and to obtain recommendations for the improvement of programs of teacher education in agriculture. Bronson (1963) used a jury of head teacher educators in agriculture to develop an evaluative instrument for use in studying the programs of agricultural education in 15 land-grant institutions with enrollment predominantly Negro. Gadda (1963) devised a system for evaluating the undergraduate program of teacher education in agriculture whereby ratings indicating the extent to which the outcomes of the programs were consonant with the needs of beginning teachers were made by beginning teachers, supervising teachers who had directed their student teaching, school administrators, and high school pupils of the beginning teachers. The rating scales developed by Gadda measure the level of competence possessed and the importance of each of 160 competencies needed by beginning teachers.

The Teacher and the Role of the Teacher

Studies of the perception of the role of the teacher of agriculture reveal conflicting findings regarding the teachers' role both within the profession and with other groups of professional educators. Drake (1962) studied the perception of the role of the teacher of vocational agriculture held by superintendents, teacher educators, state supervisors, and teachers of agriculture. The role areas of participating in the professional work of the school, guiding and counseling, and working as members of the teaching profession were perceived by both teachers and superintendents as having high relative importance. Among all groups studied, Drake (1962) found that the lack of consensus appeared most often in the role areas pertaining to young farmer and adult farmer education. McComas (1962) found that effective teachers of agriculture and their administrators were in greater agreement concerning the role expectations of teachers and the performance of teachers than were ineffective teachers and their administrators. McComas reported also that teachers rated as most effective, when compared with teachers rated as least effective, were more active in community affairs, conducted more courses for young farmers and adult farmers, earned more hours beyond their highest degree, and taught in larger schools having slightly larger enrollments in vocational agriculture.

C. D. Bryant (1963) compared the priorities beginning teachers gave and perceived should be given to the professional roles of the teacher of agriculture with the priorities experienced teachers perceived for beginning teachers. Comparisons of the priorities beginning teachers gave with the priorities they perceived should be given revealed that the teachers perceived a priority that was higher than the priority given for the roles pertaining to teaching high school pupils and adult farmers, providing individualized instruction, and developing leadership of enrollees. Comparisons of the priorities beginning teachers gave with the priorities experienced teachers expected of beginning teachers revealed that the expectations for beginning teachers held by experienced teachers were higher than the priority given by beginning teachers for eight of the 10 teacher roles investigated. Todd (1965) found that beginning teachers' perceptions of their role as a teacher of agriculture changed little during the first year of teaching. He reported no discernible relationship between beginning teachers' perceptions of the role of the teacher and the professional problems experienced by beginning teachers. Todd (1965) discovered that beginning teachers and experienced teachers held similar perceptions for the role of the teacher.

Efforts to establish significant relationships between characteristics of teachers and teaching success have been only moderately successful. Cardozier (1965), studying a random sample of agricultural education graduates of institutions which prepare teachers of agriculture in the United States, sought to determine the relationship between achievement in undergraduate study and performance in the teaching of agriculture in the secondary schools. Measures of teaching performance were based on ratings by teachers' principals and state supervisors of agricultural education. The findings of the study indicated only a minor relationship between achievement in undergraduate study and teaching performance. Statistical analyses revealed no significant differences except when teachers were grouped according to achievement in speech and student teaching. Teachers who received higher marks in speech and student teaching were generally rated higher in teaching performance by their principals and supervisors. Cardozier (1965) indicated that the findings of this study were not inconsistent with the findings of similar studies in agricultural education and in other fields of education. Lasap (1964) studied the relationship of success in teaching vocational agriculture to teachers' precollege background in farming, supervised farming programs, participation in farm mechanics activities, and participation in the Future Farmers of America. Questionnaires were returned by 75 per cent of a sample of teachers graduated from colleges and universities in the United States in 1959 and 1960 who were teaching in 1964. Teaching success was determined by ratings of the teachers' performance by their principals. Lasap (1964) found no significant relationships between the major precollege experiences which he investigated and success in teaching.

Using the Purdue Teacher Morale Inventory, Rempel and Bentley (1963) studied the relationship between the morale of teachers of agriculture and certain characteristics and responsibilities of teachers. They found that teachers having only the bachelor's degree with no or little graduate work had significantly lower morale than teachers with more graduate work. Teachers with higher salaries and teachers who held tenure positions had significantly higher morale. Rempel and Bentley (1963) reported a high relationship between the level of morale of teachers and their expressed satisfaction with teaching. Also, high morale teachers tended to believe more strongly in the future of vocational education in agriculture.

Recruitment and Retention of Teachers

The critical shortage of teachers of agriculture is indicated by data compiled by the Professional Personnel Recruitment Committee of the Agriculture Division, American Vocational Association (Woodin, 1966). The committee reported that 1,003 persons began teaching agriculture during 1965 in the United States. There were approximately 10,000 teachers of vocational agriculture in the United States when the survey was made, thus the turnover of teachers of agriculture was approximately 10 per cent. One hundred and twenty additional teachers were needed but not available to fill positions that were vacant in

September, 1965. The Committee's survey of head state supervisors of agricultural education indicated that during the period 1966 to 1969, some 3,950 new positions for teachers of agriculture would become available. The types of teaching positions that will be available indicate the emergence of new programs of agricultural education. The Committee (Woodin, 1966) reported that almost one-half of the additional teachers will be needed for teaching production agriculture in programs for high school pupils and adults; slightly more than one-fifth of the new positions will be in high school programs which prepare for employment and advancement in the nonfarm agricultural occupations; one-fifth of the positions will be in programs of technical education in agriculture in post-high school institutions; approximately five per cent of the new positions will be in programs of agricultural education for disadvantaged youth; and slightly more than five per cent of the new positions will be needed for manpower training and other specialized programs in agricultural education.

In addition to the increased demand for teachers of agriculture created by expansion and revision of present programs and the development of new programs in agricultural education, another factor contributing to the shortage of teachers of agriculture is the great demand for persons certified to teach agriculture for employment in government, industry, business, and international programs. Woodin (1966) reported that only 65 per cent of the persons certified to teach agriculture in the United States during 1965 entered the profession of teaching agriculture as their first employment. This percentage of qualified graduates entering the teaching of agriculture as their first employment is somewhat higher than the percentage reported by other investigators. Hoerner (1965) found that 56 per cent of the men qualified to teach agriculture at Iowa State University during the period 1940 to 1964 entered teaching as their first employment. Similarly, Rhody (1964) reported that 52 per cent of the graduates in agricultural education at the University of Tennessee from 1955 to 1964 entered teaching directly upon graduation.

Studies which follow up graduates who have qualified to teach agriculture in the public secondary schools indicate that approximately two-thirds of the graduates teach agriculture in the secondary schools sometime during their career. Variations among the states are found, however. For example, 78 per cent of the graduates of Washington State University taught agriculture at one time (Myers, 1964); 64 per cent of the agricultural education graduates of Cornell University and Iowa State University had taught agriculture (Hoerner, 1965; Shoup, 1965); whereas, only 54 per cent of the graduates of the University of Tennessee who were qualified teachers of agriculture had taught agriculture in the secondary schools (Rhody, 1964).

As would be expected, the percentage of graduates qualifying to teach agriculture who continue to teach agriculture in the secondary schools decreases in direct relationship to the number of years since graduation. Available data indicate one-third or fewer of the graduates continued to hold positions as high school teachers of agriculture. Hoerner (1965) found that only 18 per cent of the agricultural education graduates of Iowa State University were teaching agriculture in high schools when his study was made; Myers (1964) and Rhody (1964) reported that 35 per cent of the agricultural education graduates of Washington State University and the University of

Tennessee were employed as teachers of agriculture when their investigations were conducted.

Graduates qualified to teach agriculture who never teach and teachers of agriculture who do not continue to teach agriculture at the high school level frequently enter other professions in the field of education. Many become teachers of other subjects in the public schools; successful teachers of agriculture frequently move into positions of college teaching or school administration; and a substantial percentage accept employment with the agricultural extension service of land-grant colleges and universities. Many persons qualified to teach agriculture enter farming; agriculturally-oriented businesses and industries provide attractive employment opportunities for many teachers of agriculture; and governmental agencies and non-agricultural businesses and professions attract persons who have taught or are qualified to teach agriculture in the secondary schools (Hoerner, 1965; Myers, 1964; Shoup, 1965).

Foremost among the reasons given by teachers of agriculture for leaving the teaching profession are considerations pertaining to advancement in salary and position. Other factors which have been identified by investigators as having strong influence on a decision not to enter or to leave the teaching profession are (a) the trend toward less emphasis on vocational education in agriculture, (b) failure to adjust to teaching such as discipline problems, lack of interest on the part of students, personality conflicts with administrator, and dislike for teaching adults, (d) the long hours and responsibility for evening work, and (e) community attitudes and standards for teachers (Hoerner, 1965; Rhody, 1964; Shoup, 1965).

Student Teaching in Agricultural Education

The findings of a comprehensive survey of student teaching in agricultural education in the United States was reported by O'Kelley (1961). The report of the study included findings pertaining to the selection of supervising teachers, the selection of schools as centers for student teaching, administrative policies and procedures pertaining to student teaching, criteria for admission of students, experiences provided student teachers, and evaluation of student teachers and the program of student teaching. Hutchinson (1961) sought to determine the activities of student teachers that were regarded by teacher educators in agriculture as most important in the formation of basic concepts essential for effective teaching. Activities appropriate to student teaching which were rated highest in importance were those relating to the organization and use of an advisory council; teaching high school pupils, young farmers, and adult farmers; and the development and supervision of farming programs of pupils. Activities rated as least important were advising the local chapter of the Future Farmers of America and publicizing and promoting the program of vocational education in agriculture.

Roger's (1964) study was designed to identify the personal and professional characteristics of supervising teachers relating to their role as supervisors of student teachers in agricultural education. Supervising teachers rated as most effective and least effective by teacher education personnel in their respective states were compared to ascertain the characteristics which distinguished one group from the other. Rogers identified the following characteristics which were positively related to the performance of supervising teachers: (a) age of the teacher, (b) employment mobility, (c) number years experience as a supervising teacher, (d) academic degree held, (e) professional reading, (f) participation in professional organizations, and (g) participation in local community organizations.

Efforts to identify factors which are predictive of success in student teaching have isolated factors which are significantly, but not highly, correlated with performance. G. R. Fuller (1963) endeavored to determine whether or not predictors concerning teaching effectiveness could be assembled into an instrument which, when administered to students just prior to student teaching, would increase the ability of teacher educators to foretell how effectively student teachers would perform. He found that extremely effective student teachers were observed to exhibit behaviors during student teaching which were characterized as fair, kindly, alert, attractive, responsible, steady, and poised. Below-average student teachers were observed to exhibit behaviors characterized as evasive, dull, stereotyped, uncertain, disorganized, inflexible, and narrow. Fuller (1963) found that the characteristics of student teachers, when converted to scores through the technique of factor analysis, correlated positively with the evaluations of actual student teaching effectiveness. He reported that the scores obtained on the instrument he developed regarding the characteristics of student teachers provided a better prediction of actual performance during student teaching than did the opinions of teacher educators concerning probable performance. Coefficients of correlation of .23 and .06, respectively, were reported between scores for characteristics of student teachers and measured actual effectiveness and between the prognosis of teacher educators and measured actual effectiveness.

Jarmin (1963) studied the relationship between success in student teaching in agricultural education and selected measures of previous achievement and experience in high school and college. The criterion of success was the weighted average grade in three rural education courses taken by prospective teachers during the program of student teaching at Cornell University. Predictors, or independent variables, found to be correlated positively and significantly to the criterion of success were grade average at end of first year in college, cumulative average at end of second year in college, average grade received in vocational agriculture in high school, number of farm practice credits awarded the student upon his entrance to college and those earned during his first year of college, and grade on the Regent's Examination in high school physics. Coefficients of correlation for the foregoing ranged from .21 to .29. Jarmin (1963) reported no significant correlations between the criterion of success and the standard college entrance examinations which he investigated.

Inservice Education

Research pertaining to inservice education in agricultural education has not been extensive. In view of the revision of existing programs and the development of new programs of agricultural education at both the high school and post-high school levels, it is imperative that the re-education and upgrading of teachers and other personnel in agricultural education be given prompt attention. Few studies have been conducted which indicate the need for or describe present programs of inservice education. R. E. Taylor's (1961) survey of state supervisory personnel in the 48 contiguous states indicated that the four areas of professional competency in which state supervisors desired further study were evaluation of the supervisory program, evaluation of local programs of vocational education in agriculture, the development of a program of public relations, and the development of leadership in educational planning. No comparable study has been made to identify the inservice education needs of teacher educators or teachers of agriculture.

Love and Stevens (1964) investigated experimentally three sequences of scheduling classes and three patterns of instruction relative to their effectiveness for providing inservice education for teachers of agriculture. Three-day workshops, weekly sessions, and monthly sessions were the sequences of scheduling classes that were investigated. The patterns of instruction investigated were class sessions taught by a teacher of agriculture who had been given intensive training to prepare for teaching the unit, class sessions taught by a teacher educator in agriculture who had received intensive training in the subject-matter to be taught, and class sessions taught by technical specialists on the university staff. Love and Stevens (1964) reported that three-day workshops taught either by qualified teachers of agriculture or teacher educators resulted in the greatest achievement, when measured by performance on a posttest, by the teachers enrolled. The practice of using technical specialists as instructors for off-campus inservice courses was not equally effective.

Miller (1965) utilized adoption-level theory to measure the progress made by teachers of agriculture in North Carolina toward the adoption of a new concept of supervised practice. He found that within a period of 17 months, two-thirds of the teachers in the sample were in the evaluation stage of adoption. One-half of these teachers were ready to begin the trial stage. An additional 17 per cent of the teachers had reached the trial stage or the adopted stage, the most advanced stages of adoption. Of 10 variables tested for relationship to level of adoption, only teaching practices showed a significant correlation. The factors of age of teacher, number of years of experience, and attitude toward vocational education tended to correlate positively, but not significantly, with the level of adoption. Christiansen's (1965) investigation of the adoption of educational innovations by experienced teachers of agriculture revealed that teachers were influenced by different sources of information at the awareness stage, the interest stage, and the adoption stage. He found that innovative teachers made more use of sources of information which were outside of agricultural education, earned more graduate credit since initial certification, invested larger amounts of money in professional growth, and attended more professional meetings than teachers who were not innovators. Christiansen (1965) reported also that teachers who were less innovative were influenced by their peers to a greater extent than were the more innovative teachers. Further research relating adoption-level theory to change and innovation in agricultural education holds promise as a fruitful area of research.

Emerging programs of agricultural education have led to programs of inservice education for teachers of agriculture which are supported financially by the Bureau of Research of the U.S. Office of Education. A facet of the project conducted by Love at the Pennsylvania State University is the upgrading of teachers in the areas of ornamental nursery production, floriculture, and turf management. Hemp directed an institute for teachers of ornamental horticulture which was held at the University of Illinois during the summer of 1966. Training institutes designed to provide teachers of vocational agriculture with competence in distributive education helpful for the conduct of programs of agricultural business were conducted at Oklahoma State University during the summers of 1965 and 1966 under the direction of Hull.

ADMINISTRATION AND SUPERVISION

Administration and Supervision of State Programs of Agricultural Education

Schroeder's (1962) investigation of the perception of the role of the state supervisor of vocational agriculture revealed that teachers of agriculture, administrators, and supervisors perceived the role of the state supervisor as that of a stimulator in respect to the operation of the local program of vocational education in agriculture. In a similar study, Law (1964) found that teachers of agriculture and administrators held similar perceptions of the role of the district supervisor of vocational agriculture. Law reported also that the perception of the role of the district supervisor held by teachers was not influenced by the number of years the teacher had been teaching.

Linson (1964) designed an instrument for the self-evaluation of state supervisory programs in agricultural education. National juries of experts in educational supervision were used in developing and refining the instrument which was validated through use by supervisory staffs in five states. Linson (1964) concluded that the instrument for self-evaluation of state programs of supervision was an effective means of bringing about change in the supervision of programs of vocational education in agriculture. The instrument developed by Linson included 121 major activities relating to an effective state program of supervision in vocational education in agriculture.

Studies of state policies pertaining to vocational education in agriculture have dealt with personnel and fiscal policies. R. E. Taylor's (1961) study of the inservice education needs of state supervisors of agricultural education indicated some findings pertaining to personnel policies. He found that less than one-half of the state supervisors in the United States were working in states which had provisions for the professional leave of supervisors. Taylor also reported that existing policies of the various states gave little financial incentive for supervisors to work for advanced degrees.

Warmbrod's (1962) study of state policies for reimbursing local school districts for costs incurred in conducting programs of vocational education in agriculture revealed that almost all of the states had adopted policies which provided reimbursement from state or federal funds for a portion of the following costs: salaries paid teachers of agriculture for teaching high school classes, salaries paid regular teachers and special instructors for teaching young farmer and adult farmer classes, and travel expenses. Less than one-fourth of the states provided reimbursement for a portion of the costs of instructional equipment and supplies. Warmbrod (1962) reported that state and federal funds for vocational education in agriculture were distributed most frequently to local school districts as reimbursement of a percentage of the expenditures incurred.

In a subsequent study, Warmbrod (1964) established that a state's policy for reimbursing local boards of education is one device which may be used to encourage the expansion and improvement of young farmer and adult farmer education in agriculture. From this study of reimbursement policies and program development in young farmer and adult farmer education in 46 of the 48 contiguous states, Warmbrod (1964) found that states adopting reimbursement policies which encouraged the development of young farmer and adult farmer education as a part of a complete program of vocational education in agriculture had a significantly higher proportion of all enrollees in vocational agriculture made up of out-of-school youth and adults than did states with reimbursement policies which encouraged local boards to pay teachers additional salaries for teaching young farmer and adult farmer classes. Also, states adopting policies encouraging complete programs of vocational agriculture were providing instruction for young farmers and adult farmers in a significantly higher percentage of all schools offering vocational agriculture than were states with policies encouraging extra pay for teachers of young farmers and adult farmers.

Administration of Programs of Agricultural Education in Local Schools

Studies pertaining to the administration of local programs of agricultural education have been concerned primarily with the administration of multiple-teacher departments of vocational agriculture. Jacoby's (1961) study of multiple-teacher departments of vocational agriculture in the United States had as its primary purpose the determination of desired levels of participation for the various administrative agents in high schools with more than one teacher of agriculture. As a result of the study, Jacoby made the following recommendations concerning the administration of multiple-teacher departments: (a) advisory councils should have an important role in suggesting policies to the board of education and superintendent; (b) a head of the department should be designated and said person should assume a major role in the administration of the program; (c) more use should be made of special teachers for young farmer and adult farmer classes; (d) students enrolled in agriculture should be grouped according to vocational objectives; and (e) there should be increased participation on the part of superintendents and principals in the program of agricultural education. R. D. Fuller (1963) surveyed teachers of agriculture in multiple-teacher departments of vocational agriculture in 13 states to identify the successful procedures followed in the delegation and division of responsibilities among teachers. He reported that teachers expressed a desire for one teacher to be designated as head of the department or as program coordinator. Also, the teachers expressed a desire that each teacher in a multiple-teacher department be given responsibility for (a) teaching high school pupils, young farmers, and adult farmers, (b) developing the annual and long-range plan of agricultural education for the school, (c) preparing the budget for the department, (d) working with the advisory council, and (e) advising the FFA.

Gibson (1963) endeavored to evaluate the effectiveness of one type of pilot program pertaining to the administration of programs of vocational agriculture. Twelve high schools were selected in which the teachers of agriculture were scheduled to teach agriculture on a part-time basis. The arrangements for the pilot program in these schools included the employment of an additional teacher for the nonvocational classes normally taught by the teacher of agriculture. Hence, teachers of agriculture in the schools conducting pilot programs devoted full time to the teaching of vocational agriculture. From the remaining schools in the state with part-time teachers of agriculture, 24 control schools were selected which were shown to be similar to the pilot schools in relation to a number of criteria. After one year of operation, a comparison of the two groups of schools revealed that the pilot schools exceeded the control schools in the number of young farmer and adult farmer classes held and the ratings attained by the FFA chapters. Teachers in the pilot schools indicated they devoted more time to agricultural mechanics, young farmer and adult farmer education, FFA, supervised work experience, program planning, preparation for class, and professional improvement than teachers in the control schools.

Advisory Committees

Cushman and Jarmin (1965) identified the characteristics of advisory committees which contributed to their successful operation.

Studying the characteristics of advisory boards for vocational agriculture in New York, they found that effective advisory boards were distinguished from ineffective advisory boards in that the former had a significantly larger number of appointed members, held significantly more meetings each year, and had a higher attendance of members than the latter. Cushman and Jarmin (1965) reported also that effective advisory boards participated in the nomination of appointed members, notified new members of their appointment by letter from the board of education, developed recommendations during group meetings, scheduled dates of future meetings at their first meeting, scheduled meetings at equal intervals throughout the year, planned a program of work for the year, planned an agenda for meetings, used rules of parliamentary procedure in meetings, studied and made recommendations pertaining to policies and programs in agricultural education, and met with a new teacher soon after his arrival in the community for the purpose of orientation.

Professional Relationships

Hopkins (1963) attempted to identify the activities of leaders in agricultural education designed to promote better professional relations with state and local school administrators and leaders of governmental and nongovernmental agencies and organizations. He identified 84 practices and procedures that were used extensively. However, some of the practices reported as most effective for some persons were used sparingly by the majority of the respondents. Hopkins found that the professional relationship activities used with school administrators were more extensive and more standardized from state to state than the activities used with leaders of agricultural organizations and agencies.

Some investigations have been concerned with the working relationships between teachers of agriculture and personnel of the agricultural extension service working in local communities. Omar's (1963) study of the working relationships of county extension agents and teachers of agriculture in Michigan indicated that the opinions of teachers and agricultural extension agents did not differ significantly with regard to the desirability of conducting a majority of the activities that were investigated. Differences were found, however, with respect to developing cooperation between 4-H and FFA and for arranging educational meetings for farmers. B. Bryant (1965) reported similar findings in Oklahoma from a study of the nature and extent of working relationships between county extension personnel and teachers of agriculture.

EVALUATION

Research which had as its primary purpose the evaluation of programs of agricultural education has been concentrated in three areas. First, numerous investigations have been conducted to ascertain the success in institutions of higher education of students who have studied agriculture in high school. Second, many studies have been conducted to determine the occupational status of former enrollees at some time following their graduation or termination of study of agriculture in high school. Emphasis in these studies has been primarily on the percentage of enrollees who enter farming and other occupations involving knowledge and skill in agriculture. Third, several well-designed studies have been completed in which the occupational success of former enrollees in vocational agriculture is compared with the occupational success of persons who did not study vocational agriculture in high school. Much of this research has been concerned with the success of persons in the farming occupations. However, recent studies have been concerned also with the entry and advancement of persons in the nonfarm agricultural occupations.

Krebs (1965) succinctly outlined some principles to be followed in evaluating programs of vocational education in agriculture in which he emphasized that the strengths of the program other than preparation for employment be ascertained and accentuated. Byram (1965) developed a procedure for the evaluation of local programs of vocational education. Criteria for evaluating local programs of agricultural education, which are somewhat out of date at the present but are being revised, were developed by the National Study of Secondary School Evaluation (1960). The current emphasis on the continuing appraisal of programs of vocational education, encouraged by the Vocational Education Act of 1963, resulted in the initiation of several extensive studies pertaining to the evaluation of vocational education. The researcher in agricultural education should be alert to the finding of these investigations.

Few studies have been reported which had as a main purpose the systematic evaluation of local or state programs of agricultural education. Eaddy's (1965) evaluative study of vocational agriculture in Florida involved the establishment of evaluative criteria, the evaluation of each aspect of the program, and the development of recommendations for the improvement of the program. The primary focus of Kent's

(1963) study of the program of vocational education in agriculture in Virginia was to evaluate the program in terms of its adequacy for meeting the needs of rural youth and adults in a changing agrarian society. Lamberth (1964) used a jury of educators to develop an instrument for use by school administrators in evaluating programs of vocational agriculture.

Success in College

The research has shown consistently and conclusively that persons who have studied agriculture in high school achieve as well as or slightly better in college than students who have not studied agriculture in high school. The evidence in support of this generalization is abundant. Tom (1960) reviewed 32 studies reported during the period 1929 to 1959 on the subject of how well former enrollees in vocational agriculture achieved in college. He found that 53.8 per cent of the findings showed that the pupils who had studied agriculture in high school had higher scholastic averages than pupils in the same institutions who had not studied agriculture in high school: 36.6 per cent of the studies showed that former enrollees in vocational agriculture did as well academically as other pupils; while 9.6 per cent of the studies indicated that the vocational group made poorer grades than the nonvocational group.

Since 1960, studies have been conducted in 11 states relating to success in college of former enrollees in vocational agriculture. The findings of these studies substantiate and enforce the conclusion presented in the preceding paragraph. Pierce (1960) found that students at Ohio State University who had studied agriculture in high school did as well academically as other students not only in the College of Agriculture but also in the Colleges of Arts and Science, Commerce, Education, and Engineering. Thomas (1960) reported that freshmen at Purdue University who had studied agriculture in high school received higher grades in an introductory animal science course than students who had not studied vocational agriculture, although there was no significant difference between the two groups when first-year cumulative grades were compared. Horner, Nuttle, and Schnieder's (1960) study at the University of Nebraska revealed that the cumulative grade averages of students in the College of Agriculture who had completed three or four years of vocational agriculture in high school were significantly higher than the grades of students who had not taken vocational agriculture in high school. Krebs' (1961) study showed that students majoring in agriculture at the University of Illinois who were former enrollees in vocational agriculture tended to earn slightly higher average grades than other students. Macomber (1961) found no significant difference in scholastic achievement in mathematics, science, technical agriculture, and total cumulative average in the College of Agriculture at Cornell University between students who had taken vocational agriculture in high school and students who had not taken vocational agriculture in high school.

Pumper and Sledge (1962) concluded that students at the University of Wisconsin who were former enrollees in vocational agriculture achieved at a significantly higher level in agronomy, animal husbandry, and chemistry, although no differences were found between that group and students who had not studied agriculture in high school in their achievement in agricultural economics, economics, American history, bacteriology, and English. Dunn (1962) established that students in the College of Agriculture at West Virginia University who had studied agriculture in high school achieved equally as well as students with no prior instruction in agriculture. Studies at Iowa State University by Bendixen (1963), Hoerner (1963) and McCracken (1962) verified that students who had taken vocational agriculture did as well as or better than other students in introductory courses in animal science, agricultural engineering, and agronomy. Beeks (1964) found that freshmen entering the University of Missouri who had completed more than one year of vocational agriculture in high school scored significantly higher on an achievement test in agronomy than students who had not studied vocational agriculture or had completed only one year of vocational agriculture in high school. O'Kelley and Lester (1963) found no statistically significant difference between the mean grades earned by freshmen at the University of Georgia when the grades of former enrollees in vocational agriculture were compared with other male students. Alvis' (1964) study at Texas A&M University disclosed similar findings.

The studies just cited indicate also that a higher percentage of the students entering colleges of agriculture who had studied agriculture in high school graduated from college than comparable students who had not been previously enrolled in high school courses in agriculture. In a study conducted at Virginia Polytechnic Institute, Bass (1961) found that 76 per cent of the former enrollees in vocational agriculture remained in college for four years in contrast to 65 per cent of the students without vocational agriculture. Pumper and Sledge (1962) reported that only 32 per cent of the group of students without vocational agriculture were graduated from the University of Wisconsin whereas 59 per cent of the students with four years of vocational agriculture were graduated. Comparable percentages from the study conducted by Krebs (1961) at the University of Illinois were 38 per cent and 71 per cent, respectively. Studies conducted at the University of Nebraska (Horner, Nuttle, and Schnieder, 1960) and Ohio State University (Pierce, 1960) confirmed the finding that a higher percentage of the former enrollees in vocational agriculture remained in college to graduate than their peers who had not studied agriculture in high school.

Occupational Status of Former Enrollees in Vocational Agriculture

Numerous studies have been conducted which had as a central purpose the determination of the occupational status at various times since leaving school of former enrollees in vocational agriculture. A large number of these investigations have been concerned with former enrollees of a particular school or community in contrast to area or state-wide studies. The emphasis for the research presented in this report will be on the more recently conducted, state-wide studies.

Studies indicating the occupational and educational status of pupils who had studied vocational agriculture in high school reveal that one year following graduation essentially all the graduates were employed or pursuing further education. Elliott (1961) found that only one per cent of the graduates of high schools in Maine who had studied agriculture were unemployed one year following graduation. Martin (1963) reported two per cent unemployment one year following graduation for high school graduates in Connecticut who had studied vocational agriculture. Webb (1961) found that six per cent of the high school graduates in Missouri who had studied vocational agriculture were unemployed one year following graduation.

Follow-up studies made several years following graduation from high school reveal also that practically all former enrollees were employed or enrolled for some type of post-high school education. Campbell's (1963) study of the occupational status of some 9,700 former pupils completing one or more years of vocational agriculture and who were graduated from or dropped out of public high schools in Virginia revealed that only 1.3 per cent of the former enrollees were unemployed. Edington and Hill (1964) studied some 4,600 graduates of Oklahoma high schools who had studied vocational agriculture and found that three per cent were unemployed when the study was made.

The research reveals that one year after leaving high school, one-half to two-thirds of the former enrollees of vocational agriculture are employed in occupations requiring knowledge and skill in agriculture or pursuing further study in agriculture at colleges and universities or other post-high school institutions. Bender (1961) found that 66 per cent of the graduates of vocational agriculture in Ohio were working in agricultural occupations or pursuing advanced study in agriculture one year following graduation. Forty-nine per cent were farming, nine per cent were employed in nonfarm agricultural occupations, and eight per cent were studying agriculture in college. Elliott (1961), excluding former enrollees who were in the military service, found that 62 per cent of the graduates in Maine were farming, employed in nonfarm agricultural occupations, or studying agriculture in college one year following graduation. Martin (1963) established that 51 per cent of the graduates in Connecticut were in the three categories listed for the two previous studies.

Studies to determine the occupational status a few years after leaving school of former enrollees in vocational agriculture reveal that from one-third to one-half were working in positions involving knowledge and skill in agricultural subjects. Bender (1961) found that 59 per cent of the graduates who had studied vocational agriculture in Ohio were engaged in agricultural pursuits five years following graduation. Forty-four per cent were in farming, 11 per cent were employed in nonfarm agricultural occupations, and four per cent were studying agriculture in institutions of higher learning. Campbell (1963) reported that 62 per cent of the former enrollees whom he studied were employed in some phase of agriculture or were employed in an occupation directly related to the mechanical training received in vocational agriculture. Campbell related that 26 per cent of the former enrollees were farming, 11 per cent were employed in or receiving training for nonfarm agricultural occupations, and 25 per cent were employed in occupations of a mechanical nature. Some 10 years following graduation from high school, Eggenberger (1964) established that 44 per cent of the graduates of West Texas high schools who had studied agriculture were working in agricultural vocations. Thirty-one per cent were farm operators, farm managers, or farm laborers; 12 per cent were employed in nonfarm agricultural occupations; and one per cent were studying agriculture in college. A similar study (Robinson, 1964) of high school graduates who had studied vocational agriculture in Iowa revealed that 10 years after graduation 32 per cent of the former enrollees were owners, managers, or laborers on farms and 13 per cent were employed in nonfarm agricultural occupations in business and industry.

Hayles' (1963) study of high school graduates in Louisiana who had completed four years of vocational agriculture revealed that 16 per cent were farming and 14 per cent were employed in nonfarm agricultural occupations. Edington and Hill (1964) found that 18 per cent of the graduates of vocational agriculture in Oklahoma were farming, 11 per cent were employed in nonfarm agriculturally-oriented businesses, and 12 per cent were enrolled in colleges of agriculture. Williams (1965) studied former pupils who had been enrolled in vocational agriculture in Arizona and found, when the occupational plans of the graduates who were in school or in military service were combined with the occupations of the graduates employed at the time of the study, that 44 per cent of the graduates either were or would be engaged in agricultural pursuits. Twenty-eight per cent of the former students indicated a preference for occupations in production agriculture and 16 per cent indicated a preference for employment in nonfarm agricultural occupations.

Generally, the recent studies of the occupational status of former enrollees of vocational agriculture reveal the following: (a) there is considerable variation among the states in the percentage of persons who had studied agriculture in high school who enter the vocation of farming--about one-third seems to be the most frequently reported percentage; (b) from 10 to 16 per cent of the former enrollees are entering nonfarm occupations in business and industry which involve knowledge and skill in agriculture, a substantial increase in the percentage of former enrollees who entered these occupations prior to 1960 (Bishop and Tolley, 1963); (c) the percentage of graduates engaged in farming decreases slightly as the number of years since graduation increases (Bender, 1961; Bradley, 1962; Edington and Hill, 1964); (d) the percentage of graduates engaged in nonfarm agricultural occupations and in nonagricultural occupations increases as the number of years since graduation increases (Bender, 1961; Bradley 1962; Edington and Hill, 1964); (e) the percentage of former enrollees in the military service increases from approximately 10 per cent one year following graduation to approximately 16 to 20 per cent two, three, and four years following graduation (Bradley, 1962; Edington and Hill, 1964; Williams, 1965); and (f) from one-third to over one-half of the former enrollees of vocational agriculture attend college and of those who attend, from one-third to one-half major in agriculture (Edington and Hill, 1964; Eggenberger, 1964; Hayles, 1963; Williams, 1965).

Several of the studies of the occupational status of former enrollees in vocational agriculture attempted also to ascertain the respondents' opinions concerning the value of their training in vocational agriculture for their present employment. As would be expected, those persons working in farming and nonfarm agricultural occupations valued the instructional program in agriculture more highly than those persons employed in nonagricultural occupations. However, a substantial number of former enrollees in vocational agriculture who were working in nonagricultural occupations indicated that they had profited from their experiences in vocational agriculture. Prominant among the values of studying vocational agriculture in high school listed by former enrollees were the acquisition of abilities of leadership, the ability to work harmoniously and cooperatively with others, and the development of high standards of workmanship (Eggenberger, 1964; Hayles, 1963; Robinson, 1964; Williams, 1965). Richard and Bass (1965) indicated that enrollment in vocational agriculture was given frequently by pupils as a reason for continuing their enrollment in high school.

Success in Farm and Nonfarm Occupations

In a pioneering study, Hoover (1957) compared the degree of establishment in nonfarm agricultural occupations of persons who had studied vocational agriculture in high school with persons in the same occupations who had not studied vocational agriculture in high school. The criteria of establishment and success used in the study were job satisfaction, advancement in the occupation, annual income, increase in net worth, and leadership activities. Hoover (1957) found that the mean values for all criteria were significantly higher for those persons who had studied agriculture in high school. Phipps (1962a) cited other studies which indicated that graduates who had studied vocational agriculture in high school were as successful in entering and advancing in the nonfarm agriculturally-oriented businesses and industries as graduates who had not studied vocational agriculture in high school. The data presented by Roberts (1965) indicated that former enrollees in vocational agriculture acquired skills in agricultural mechanics that were used effectively in the nonfarm occupations, both agricultural occupations and nonagricultural occupations.

Many research studies relating to the occupational success of former enrollees in vocational agriculture have been concerned with the success of those persons who entered farming. The most extensive studies of this nature were those conducted at Iowa State University during the late 1950's. The investigators sought to determine the relationship of the study of vocational agriculture in high school to establishment in farming. The design of the studies involved comparisons of graduates of high schools which offered vocational agriculture with graduates of comparable high schools which did not offer vocational agriculture. Using this purpose and design, Nielsen (1958) established that farm operators who had completed three or more years of vocational agriculture in high school had higher crop, livestock, and total gross products from their farms and had used more improved production and management practices than high school graduates who had not received equivalent training in vocational agriculture.

K. E. James (1961) compared a group of Missouri farmers who had studied vocational agriculture in high school with a group of farmers who had not studied vocational agriculture. All farmers in the study were full-time farmers, were less than 55 years of age, and were high school graduates. He found that the net income was higher and the use of recommended practices was more extensive for the farmers who had studied vocational agriculture in high school. Lester's (1961) study of young farmers in Missouri revealed that young farmers who had completed four years of vocational agriculture in high school had higher farm assets, higher farm net worth, and higher farm income than young farmers who had not studied vocational agriculture or had been enrolled in vocational agriculture for less than four years.

O'Kelley and Lester (1965) studied a group of randomly-selected farmers in eight counties in Georgia and found the farmers who had studied vocational agriculture in high school had adopted a significantly larger number of recommended practices in all crop and livestock enterprises than the farmers who had not studied vocational agriculture in high school.

Cvancara (1964) attempted to determine whether or not instruction in farm management influenced income by studying two groups of farm units in 20 Minnesota communities. The farm units were paired on the basis of certain economic factors. The operators of one group of farm units had participated for three consecutive years in a program of instruction in farm management. Operators of the other group of farm units had participated in the instructional programs in farm management only during the third year of instruction. Cvancara (1964) discovered that farmers in the group receiving instruction during the three years had average farm incomes which were more than 500 dollars higher than the farmers who had received the instruction only one year.

The research has been consistent in the finding that farmers who had studied vocational agriculture in high school are more receptive to and participate more frequently in programs of adult farmer education than farmers without prior agricultural instruction in high school (R. E. James, 1961; Jensen, 1961; O'Kelley and Lester, 1965). Blake (1963) found that farmers who were former enrollees in vocational agriculture participated more in farm organizations than farmers who had not studied vocational agriculture.

Assessment of the Achievement of Enrollees

Few studies in agricultural education have dealt with the development and validation of tests for the assessment of pupils' achievement in agriculture. McCormick (1964) developed an instrument for measuring the understanding of basic profit-maximizing principles essential for efficient operation and management of a farm business. The reference group used for developing and refining the instrument included 158 farm owners. An index indicating the relative level of managerial competence was computed for each farmer. A comparison of the farmers' achievement on the evaluative instrument and the farmers' level of managerial competence revealed no significant relationship between the two factors. Ebbert (1964) developed a multiple-choice achievement test appropriate for use with high school pupils concerning the fundamentals of operation, care, and maintenance of small gasoline engines. The refinement of the instrument, through item analysis, resulted in a 100-item instrument for which norms were derived from the performance on the test of 902 pupils enrolled in vocational agriculture.

RESEARCH

Smith (1944), Martin (1947), Sutherland (1950), and Phipps (1956, 1962a) prepared reviews of research in agricultural education which have been published in the Review of Educational Research. Hamlin (1941), Hamlin and Deyoe (1950), and Sledge (1960) authored digests of research in agricultural education which have appeared in the Encyclopedia of Educational Research. Hemp (1962) prepared a comprehensive summary of research in agricultural education. Abstracts of research in agricultural education have been compiled regularly by the Research Committee of the Agricultural Education Section, American Vocational Association (1962, 1965). These abstracts are published by the U.S. Office of Education as a series entitled Summaries of Studies in Agricultural Education.

Critiques of research have identified those aspects of research in agricultural education in most need of improvement. The emphasis on descriptive studies of past experience which employ survey techniques has been alluded to repeatedly (Hamlin and Deyoe, 1950; Phipps, 1962b, Smith, 1944). The fact that much of the research in agricultural education has been conducted by graduate students has been indicated by Sutherland (1950) and Hamlin and Deyoe (1950). The need for greater efforts to develop tools and techniques for evaluation has been emphasized by Smith (1944) and Hamlin and Deyoe (1950). Smith (1944) and Sutherland (1950) emphasized the need for research which extends over a long period of time and for cooperative research efforts on a nation-wide or regional basis. Hamlin and Deyoe (1950) advocated the thorough study of outstanding practices for the purpose of identifying and defining conditions which are associated with the results. The use of more appropriate methods of sampling has been proposed (Hamlin and Deyoe, 1950; Phipps, 1962b). The lack of implementation of research findings has been mentioned by Smith (1944) and Sutherland (1950). And finally, the use of pilot programs and demonstration centers as means of applying and refining the findings of research in agricultural education has been proposed continuously for the past 25 years (Hamlin, 1941; Hamlin and Deyoe, 1950; Sutherland, 1950; Phipps, 1962b).

Research on research in agricultural education has been scant. Wessman (1963) categorized the 3,004 studies in agricultural education which had been published from 1935 to 1960 in Summaries of Studies in Agricultural Education. He found the areas in which research was most frequently conducted were (a) curriculum, (b) administration, (c) measurement and evaluation, (d) follow-up of graduates, (e) supervised farming, (f) adult education, (g) teacher education, (h) Future Farmers of America, (k) young farmer education, and (j) veterans' program. Wessman reported the areas researched less frequently were (a) research, (b) objectives, (c) multiple-teacher departments, (d) contests, fairs, and shows, (e) supervision, and (f) public relations and promotion.

Agricultural educators have addressed themselves to the task of improvement of research in agricultural education. Phipps (1962b), in his critique of research in agricultural education, gave special attention to the improvement of research design. R. E. Taylor (1966) presented a cogent argument calling for appropriate administrative policy and organizational structure which would insure deliberate procedures for initiating needed research in agricultural education and for identifying, developing, testing, and disseminating promising educational innovations. Phipps (1965b) prepared guides for implementing, conducting, and evaluating pilot programs in vocational education. Warmbrod (1965) outlined some of the factors to be considered in research involving techniques of sampling. Nielsen (1965) emphasized the need for research and development in agricultural education and described the procedure for approval of research proposals submitted to the U.S. Office of Education for funding.

CONCLUSIONS AND RECOMMENDATIONS

The research in agricultural education has been to a considerable extent descriptive in nature. However, some studies currently in progress as well as some recently completed investigations signal the emergence of the more extensive use of correlational and experimental research. Many of the descriptive studies which were reviewed involved correlational aspects in that variables were identified and defined which were associated with the conditions or results disclosed by the investigation. The correlational studies have been concerned primarily with static variables such as occupational status, years of schooling, and scholastic standing rather than dynamic variables such as methods of teaching, type of occupational experience, length of training program, and similar factors amenable to experimentation.

In contrast to many of the early studies in agricultural education, most of the descriptive research conducted during the past five years involved a scheme of probability sampling. The major weakness of the descriptive research conducted was the profuse use of survey techniques that involved mailed questionnaires for collecting data. Also the phenomenon of nonresponse was, for all practical purposes, ignored. The failure of an investigator to recognize the problems created by nonresponse limits considerably the generalization of the findings, particularly when evidence is not presented which indicates that nonrespondents are more like than they are unlike the respondents. In the absence of evidence to the contrary, the latter is the safer assumption especially with regard to certain crucial factors being investigated.

Researchers in agricultural education should seek alternatives to the preponderance of research which has as its sole purpose the identification of desirable practices through studies of the present status or the solicitation of opinions of knowledgeable persons concerning desirable practices and procedures. Studies of these types, although desirable and necessary, should serve as the basis for the formulation of hypotheses which motivate other types of research. Promising practices and techniques identified through descriptive research should be subjected to rigorous investigation through pilot studies, field-testing, and experimentation.

The research reported indicates that the first half of the present decade has seen the emergence of pilot programs and demonstration centers as means of implementation and innovation in agricultural education. The dissemination and implementation of research findings remain as major problems in agricultural education. The use of pilot programs should be refined and extended in an effort to alleviate these problems. Researchers should prepare popularized as well as technical reports of research. A systematic, coordinated approach to research and development in agricultural education within a state or region holds promise for the effective dissemination and implementation of research findings.

It is clear that an individualized approach to research in agricultural education has been most prevalent. A majority of the studies cited in this report were conducted by graduate students. The results of this approach to research are evident. First, the problems investigated must be limited to those which can be accomplished in a relatively short period of time. Many of the most crucial investigations in agricultural education are not amenable to such limitations. Second, there is ample evidence to indicate that the findings of individualized research are rarely cumulative. Consequently, the development of coherent theory and practice in agricultural education as a result of research has been meager. Third, research conducted primarily by graduate students is usually not readily disseminated and implemented. The reason for this lack of implementation is not that the findings are invalid or unimportant but because the researcher is rarely in a position to implement the findings. Also, a graduate student's main goal is reporting, not implementing, findings.

A notable exception, both to an individualized approach to research and to the graduate student as a researcher, is the vast number of recent studies dealing with employment opportunities and competencies needed for employment in the nonfarm agricultural occupations which were coordinated by The National Center for Advanced Study and Research in Agricultural Education and conducted by teacher education and supervisory staffs. The availability of funds for research under the provisions of the Vocational Education Act of 1963 indicates the beginning of a trend where research in agricultural education is no longer primarily the domain of the graduate student. The need in the past has been adequate funds for research in agricultural education. The impediment to research in agricultural education in the immediate future is likely to be a scarcity of trained personnel.

A comparison of this review of research in agricultural education with previous reviews reveals some interesting trends. Most noticeable, of course, is the fact that recent research reflects the broadened objectives of vocational and technical education in agriculture. Heretofore, little research has been reported pertaining to manpower needs and employment opportunities in the nonfarm agriculturally-oriented businesses and industries. The curriculum research of the past five years has assumed new dimensions. First, there have been systematic occupational analyses to identify the competencies needed by workers in the nonfarm agricultural occupations. Second, the focus of much of the curriculum research has not been on the local community as it has been in the past but on area or state-wide studies with resulting curriculum recommendations that have broad applicability. And finally, for the first time curriculum research in agricultural education has attempted to define the agricultural knowledges and skills that are common both to the farm and nonfarm sectors of our society.

Another new dimension indicated by the recent research is the development of programs of post-high school technical education in agriculture. The concern of agricultural educators for supervised experience in business and industry is evidenced by recent research. Renewed emphasis on innovation and evaluation is clearly discernible. The research studies under way indicate that evaluation of programs of agricultural education will be broadly conceived rather than limited to a study of the proportion of former enrollees who enter farming and other occupations involving agricultural knowledge and skill.

Research pertaining to the role of teachers of agriculture and supervisors of agricultural education has been initiated during the past five years. The investigations have not indicated clearly, however, the implications of this research for agricultural education.

The statement of other reviewers that more and better designed research is needed in all areas of agricultural education is still appropriate. The piecemeal approach to research in agricultural education has limited the number of definite conclusions. When such conclusions were warranted, an attempt was made to make them explicit throughout the report. Some areas of concern which should continue to command the attention of the researcher in agricultural education follow.

Of paramount importance is the evaluation of programs of agricultural education. Evaluative studies should be broadly conceived to identify and appraise all outcomes of programs of agricultural education rather than being limited to an investigation of the contributions of agricultural education to proficiency in agricultural occupations. Also evaluative studies are needed to assess broad outcomes of vocational education in agriculture instead of limiting evaluation to whether or not persons trained are employed in the occupation for which trained. The mandate of recent legislation that evaluations of local and state programs be made in reference to current and projected manpower needs and job opportunities identifies an important area of research. Continuing investigations should be conducted to identify the present and emerging occupations in business and industry that require knowledge and skill in agricultural subjects. Studies of local and area needs for operators of farms are needed since national projections are not appropriate in many cases.

Curriculum research should be continued to insure that instructional programs are kept up-to-date. The implementation of curriculum innovations through pilot programs and demonstration centers should be accelerated. The vast amount of instructional materials being developed should be field-tested and revised to insure their maximum effectiveness.

Long-range studies from which theory and practice evolve pertaining to teaching and learning in agricultural education are of upmost importance.

Supervised practice in agricultural education, including supervised occupational experience, should be a fruitful area of research.

The role of student organizations in agricultural education and the identification and evaluation of appropriate activities of student organizations are subjects which should be investigated.

The emerging programs of post-high school technical education in agriculture should evolve from and be based on sound programs of research and development.

Research pertaining to programs of agricultural education for disadvantaged youth and adults should be expanded.

There has been very little research pertaining to general and nonvocational education in agriculture. Research in this area must be forthcoming if this facet of agricultural education is to develop.

The development of new programs of vocational and technical education in agriculture necessitates that research pertaining to the preparation, retraining, and upgrading of teachers, supervisors, and teacher educators be instigated.

Research pertaining to the administration and supervision of agricultural education is essential. Innovations in administrative policy and organizational structure pertaining to finance, staff, facilities, research, and program development should be systematically evaluated. Policy and policy development are areas which have not been researched extensively.

And lastly, the researcher in agricultural education should not ignore research which has as its main purpose the evaluation and refinement of research designs, techniques, and instruments.

BIBLIOGRAPHY

Agan, R. J. "Kansas Studies Agriculture Non-Farm Occupations." *Agricultural Education Magazine* 37: 15-16; July 1964.

Albracht, James J. *A Process for Determining Vocational Competencies for the Performance of Nine Essential Activities for Sales Personnel in the Feed Industry, and the Loci at Which the Competencies Could be Taught.* East Lansing: College of Education, Michigan State University, 1966. 137 pp.

Aldrich, Glenn Conan. *An Investigation to Identify the Aspects of Occupations Which Rural Boys Consider Important in Choosing an Occupation.* Master's thesis. Pullman: Washington State University, 1962. 52 pp.

Al-Salman, Muhsin Hussain. *The Role of Prevocational Agriculture in the Junior High Schools of New York State.* Doctor's thesis. Ithaca, N.Y.: Cornell University, 1965. 135 pp. Abstract: *Dissertation Abstracts* 26: 1; No. 1, 1965.

Alvis, Thomas V. *The Effect of Various Levels of Vocational Agriculture in High Schools on Academic Achievement of Freshmen Agriculture Students at Texas A & M University in 1963-64.* Master's thesis. College Station: Texas A & M University, 1964. 36 pp.

American Vocational Association, Professional Information Committee, Agricultural Education Division. *A Description and Source Listing of Professional Information in Agricultural Education, 1965-66.* Washington, D.C.: American Vocational Association, 1965. 20 pp.

American Vocational Association, Research Committee, Agricultural Education Section. *Summaries of Studies in Agricultural Education.* Vocational Division Bulletin No. 300, Agricultural Series No. 78, Supplement No. 15. Washington, D.C.: Government Printing Office, 1962. 51 pp.

American Vocational Association, Research Committee, Agricultural Education Section. *Summaries of Studies in Agricultural Education.* Vocational Division Bulletin No. 180. Agricultural Series No. 80, Supplement No. 16. Washington, D.C.: Government Printing Office, 1965. 71 pp.

Anderson, Harold. "Guidelines for Planning and Conducting Cooperative Work Experience Programs." *Agricultural Education Magazine* 38: 249; May 1966.

Bailey, Joseph Kenna. *Non-Farm Agricultural Employment in West Virginia With Implications for Vocational Education Programs.* Doctor's thesis. Columbus: The Ohio State University, 1964. 202 pp. Abstract: *Dissertation Abstracts* 25: 6859; No. 12 1965.

Baker, James K. *Determining Employment Opportunities and Educational Needs for Animal Science Technicians in Ohio.* Doctor's thesis. Columbus: The Ohio State University, 1965. Abstract: *Dissertation Abstracts* 27: 1-B: No. 1, 1966.

Baker, Richard A. *A Comprehensive Study of Three Selected Areas of Farm Mechanics as a Basis for Curriculum Construction and Course Planning.* Doctor's thesis. Stillwater: Oklahoma State University, 1964. 248 pp. Abstract: *Dissertation Abstracts* 26: 1418; No. 3, 1965.

Baker, Richard A. *A Study of Employment Opportunities in Off-Farm Agricultural Occupations in Alabama.* Auburn, Ala.: School of Education, Auburn University, 1965. 95 pp.

Baker, Richard A. *A Study of the Educational Needs for Workers Engaged in Occupations in Off-Farm Agricultural Businesses in Alabama.* Auburn, Ala.: School of Education, Auburn University, 1966. 66 pp.

Barwick, Ralph P. *Identification of Off-Farm Agricultural Occupations and the Education Needed for Employment in These Occupations in Delaware.* Doctor's thesis. University Park: Pennsylvania State University, 1965. 195 pp. Abstract: *Dissertation Abstracts* 26: 6267; No. 11, 1966.

Bass, B. C. "To What Extent Do Former Vocational Agriculture Students Succeed in College?" *Agricultural Education Magazine* 34: 134-135, 137; December 1961.

Beam, Homer E. *An Analysis of Socio-Economic Trends as an Aid to Program Planning in Vocational Agriculture in North Carolina.* Doctor's thesis. Chapel Hill: University of North Carolina, 1961. 273 pp. Abstract: *Dissertation Abstracts* 22: 2645; No. 8, 1962.

Beard, Harry G. *A Study of the Meaning of Selected Program Planning Concepts in Vocational Education.* Doctor's thesis. Ithaca, N.Y.: Cornell University, 1965. 108 pp.

Beeks, John C. *Pre-College Experiences as Preparation for College Courses in Agronomy.* Doctor's thesis. Columbia: University of Missouri, 1964. 117 pp. Abstract: *Dissertation Abstracts* 25: 3909; No. 7, 1965.

Bender, Ralph E. "Vocational Status of Ohio Graduates in Vocational Agriculture When Out-of-School One and Five Years." Agricultural Education Magazine 33: 236-237; April 1961.

Bendixen, Joe Francis. Relation of High School Vocational Agriculture to Achievement in College Courses in Animal Science. Master's thesis., Ames: Iowa State University of Science and Technology, 1963. 83 pp.

Bennett, William C. Competencies in Soil Management and Use of Fertilizers Needed by Farmers. Master's thesis. Ames: Iowa State University of Science and Technology, 1965. 91 pp.

Bentley, Ralph R. Factors Influencing the Vocational Choices of Agriculture College Freshmen. Lafayette, Indiana: Department of Education, Purdue University, 1963. 51 pp.

Bentley, Ralph R., and Scott, Carl F. "Teacher Activities and the Completion of Productive Enterprise Projects." Agricultural Education Magazine 34: 58-62; September 1961.

Benton, Ralph A. Factors Influencing the Employment Opportunities for Out-of-School Farm Boys in Sixteen Southern Illinois Counties; Implications for the Agricultural Education Program. Carbondale: Department of Agricultural Industries, Southern Illinois University, 1960. 32 pp.

Bingham, William R. Agricultural Occupations Other Than Farming in Selected Kentucky Counties With Implications for Vocational Education. Doctor's thesis. Lexington: University of Kentucky, 1965. 250 pp.

Binkley, Harold. Course of Study in Nonfarm Agricultural Occupations. Lexington: Department of Agricultural Education, University of Kentucky, 1965. 200 pp. (a)

Binkley, Harold. Initiating Programs in Nonfarm Agricultural Occupations. Lexington: Department of Agricultural Education, University of Kentucky, 1965. 45 pp. (b)

Bishop, C. E., and Tolley, G. S. "Manpower in Farming and Related Occupations." Appendix II. Education for a Changing World of Work. Washington, D.C.: Government Printing Office, 1963. 51 pp.

Bittner, Richard H. Identification of Selected Characteristics Associated With Continued Student Enrollment in Vocational Agriculture. Doctor's thesis. East Lansing: Michigan State University, 1962. 199 pp. Abstract: Dissertation Abstracts 23: 3791; No. 10, 1963.

Blake, Duane L. *Relationship of High School Training in Vocational Agriculture to Subsequent Establishment in Farming and Participation in Organized Groups.* Doctor's thesis. Ames: Iowa State University of Science and Technology, 1963. 235 pp. Abstract: *Dissertation Abstracts* 24: 4048; No. 10, 1964.

Bodenhamer, Schell H. *A Study of the Effects of Presenting Informative Speeches With and Without the Use of Visual Aids to Voluntary Adult Audiences.* Doctor's thesis. Columbus: The Ohio State University, 1964. 197 pp. Abstract: *Dissertation Abstracts* 25: 976; No. 2, 1964.

Bradley, Howard R. "The Status of Kansas High School Graduates Who Majored in Vocational Agriculture." *Agricultural Education Magazine* 35: 100; November 1962.

Bronson, Clement A. *An Evaluation of Selected Aspects of Agricultural Education Programs in the Inter-Regional Land-Grant Institutions of the United States.* Doctor's thesis. Columbus: The Ohio State University, 1963. 565 pp. Abstract: *Dissertation Abstracts* 24: 4496; No. 11, 1964.

Brown, Herman D. *An Investigation of Attitudes and Opinions Held by Teachers of Vocational Agriculture and Their Administrators Regarding Selected Areas of the Vocational Agriculture Program.* Doctor's thesis. Stillwater: Oklahoma State University, 1965. 106 pp. Abstract: *Dissertation Abstracts* 27: 63-A; No. 1, 1966.

Brown, W. J., Jr., and Love, G. M. "Dimension Project Underway at Penn State," *Agricultural Education Magazine* 38: 58; September 1965.

Bryant, Bert. *A Study of Opinions and Attitudes Expressed by County Extension and Vocational Agriculture Teachers in Oklahoma Regarding the Nature and Extent of Desirable Cooperative Working Relationships.* Master's thesis. Stillwater: Oklahoma State University, 1965. 26 pp.

Bryant, Charles D. *Role Priorities of Beginning and Experienced Teachers of Vocational Agriculture in North Carolina.* Doctor's thesis. East Lansing: Michigan State University, 1963. 141 pp. Abstract: *Dissertation Abstracts* 25: 1023; No. 2, 1964.

Byram, Harold M. *Evaluation of Local Vocational Education Programs.* East Lansing: Bureau of Educational Research Services, Michigan State University, 1965. 81 pp.

Campbell, J. M. *A Follow-Up Study of Former Students of Vocational Agriculture in Virginia.* Richmond: Virginia State Department of Education, 1963. 6 pp.

Cardozier, V. R. *Undergraduate Academic Achievement and Teaching Performance.* College Park: Agricultural Experiment Station, University of Maryland, 1965. 76 pp.

Center for Research and Leadership Development in Vocational and Technical Education. Agricultural Chemicals Technology. Columbus: The Ohio State University, 1965. (a)

Center for Research and Leadership Development in Vocational and Technical Education. Course Outline for Agricultural Machinery--Service Occupations. Columbus: The Ohio State University, 1965. 32 pp. (b)

Center for Research and Leadership Development in Vocational and Technical Education. Course Outline for Agricultural Supply--Sales and Service Occupations. Columbus: The Ohio State University, 1965. 28 pp. (c)

Center for Research and Leadership Development in Vocational and Technical Education. Course Outline for Horticulture--Service Occupations. Columbus: The Ohio State University, 1965. 22 pp. (d)

Center for Research and Leadership Development in Vocational and Technical Education. Summary of Research Findings in Off-Farm Agricultural Occupations. Columbus: The Ohio State University, 1965. 84 pp. (e)

Christensen, Virgil E. Factors Influencing Acquisition and Retention of Learning in Vocational Agriculture. Doctor's thesis. Madison: University of Wisconsin, 1964. 489 pp. Abstract: Dissertation Abstracts 25: 2344; No. 4, 1964.

Christiansen, James E. The Adoption of Educational Innovations Among Teachers of Vocational Agriculture. Doctor's thesis. Columbus: The Ohio State University, 1965. Abstract: Dissertation Abstracts 27: 136-A; No. 1, 1966.

Clark, Raymond M. "The Nature of Non-Farm Agricultural Occupations." In J. R. Warmbrod (Ed.), New Dimensions in Public School Education in Agriculture. Danville, Ill.: Interstate, 1962. Pp. 9-17.

Clark, Raymond M. Training for Off-Farm Agricultural Occupations. East Lansing: College of Education, Michigan State University, 1963. 27 pp.

Clary, J. R. "Four Steps for Pilot Programs." Agricultural Education Magazine 37: 14-15; July 1964. (a)

Clary, J. R. Guidelines for the Development of Training Programs for Agricultural Technicians. Doctor's thesis. Columbus: The Ohio State University, 1964. 309 pp. (b) Abstract: Dissertation Abstracts 25: 4474; No. 8, 1965.

Clover, Everett L. "A Study of Community Farming Opportunities as a Basis for Program Planning." Agricultural Education Magazine 35: 6-8; July 1962.

Cooper, Elmer L., Jahns, Irwin R., and Cardozier, V. R. *A Profile of Vocational Agriculture Pupils in Maryland.* College Park: Department of Agricultural and Extension Education, University of Maryland, 1965. 11 pp.

Coupland, Joe. *Importance of Units of Instruction in the High School Vocational Agriculture Curriculum*. Doctor's thesis. Columbus: The Ohio State University, 1962. 259 pp. Abstract: *Dissertation Abstracts* 24: 194; No. 1, 1963.

Courtney, Elwood W. *A Comparison of Knowledge and Experience Levels Required in Three Agricultural Occupations*. Doctor's thesis. Lafayette, Ind.: Purdue University, 1962. 80 pp. Abstract: *Dissertation Abstracts* 23: 2751; No. 8, 1963.

Courtney, E. Wayne, and Coster, John K. "Non-Farm Agricultural Occupations and Curriculum Planning." *Agricultural Education Magazine* 36: 32-33; August 1963.

Cushman, Harold R., Christensen, Virgil E., and Bice, Garry R. *A Study of Off-Farm Agricultural Occupations in New York State*. Ithaca, N.Y.: Rural Education Department, Cornell University, 1965. 95 pp.

Cushman, Harold R., and Jarmin, Martin V. *The Organization and Utilization of Agricultural Advisory Boards in New York State.* Ithaca, N.Y.: Agricultural Education Division, Cornell University, 1965. 118 pp.

Cvancara, Joseph G. *Input-Output Relationships Among Selected Intellectual Investments in Agriculture*. Doctor's thesis. Minneapolis: University of Minnesota, 1964. 113 pp. Abstract: *Dissertation Abstracts* 26: 845; No. 2, 1965.

Daugherty, R. Gene. *The Development and Evaluation of a Unit of Instruction on Beef Marketing*. Master's thesis. University Park: Pennsylvania State University, 1965. 121 pp.

Davis, Philip B. "Selected Factors Associated With Attendance at Adult Farmer Classes." *Agricultural Education Magazine* 33: 179-181; February 1961.

Dayger, Willis G. *The Effectiveness of the Programed Instructional Unit "Figuring Board Feet" for Teaching Vocational Agriculture Students in New York State*. Master's thesis. Ithaca, N.Y.: Cornell University, 1965. 149 pp.

Deyoe, George P. *Some Comparisons of Male Graduates With and Without Vocational Agriculture in Selected Illinois High Schools.* Urbana: Division of Agricultural Education, University of Illinois, 1961. 21 pp.

Dillon, Roy Dean. *Comparison of Certain Abilities Needed by Workers in Licensed Nurseries and Licensed Ornamental Horticulture Businesses*. Doctor's thesis. Urbana: University of Illinois, 1965. 262 pp. Abstract: *Dissertation Abstracts* 26: 188; No. 1, 1965.

Douglas, Dale B. "An Evaluation of the Educational Objectives of Vocational Agriculture by Idaho School Administrators." *Agricultural Education Magazine* 35: 13-14; July 1962.

Drabick, Lawrence W. *The Vocational Agriculture Student and His Peers*. Raleigh: Departments of Agricultural Education and Rural Sociology, North Carolina State University, 1963. 60 pp.

Drake, William E. *Perceptions of the Vocational Agriculture Teacher's Professional Role in Michigan*. Doctor's thesis. East Lansing: Michigan State University, 1962. 240 pp. Abstract: *Dissertation Abstracts* 23: 643; No. 2, 1962.

Drawbaugh, Charles C. *A Teaching Experiment in the Use of Greenhouse Facilities in Vocational Agriculture*. Doctor's thesis. University Park: Pennsylvania State University, 1963. 124 pp. Abstract: *Dissertation Abstracts* 24: 4581; No. 11, 1964.

Dunn, Billy Ray. *Comparison of Certain Factors Between West Virginia University College of Agriculture Enrollees, 1950-60, Having and Not Having Vocational Agriculture in High School*. Master's thesis. Morgantown: West Virginia University, 1962. 57 pp.

Eaddy, Kenneth M. *A Critique of the Agricultural Education Program in Florida*. Doctor's thesis. Gainesville: University of Florida, 1965. 240 pp. Abstract: *Dissertation Abstracts* 26: 1423; No. 3, 1965.

Ebbert, J. Marvin. *The Development of a Standardized Achievement Test for Small Gasoline Engine Instruction*. Doctor's thesis. Lafayette, Ind.: Purdue University, 1964. 161 pp. Abstract: *Dissertation Abstracts* 26: 902; No. 2, 1965.

Edgecomb, Philip L. *Effects of Conceptual and Factual Verbal Presentations Upon Reading Achievement*. Doctor's thesis. University Park: Pennsylvania State University, 1961. 129 pp. Abstract: *Dissertation Abstracts* 22: 3944; No. 11, 1962.

Edington, Everett D., and Hill, Ronald E. *The Present Occupational Status of Oklahoma High School Vocational Agriculture Graduates Over the Past Five Year Period From 1959 to 1963*. Research Bulletin Number 5. Stillwater: Department of Agricultural Education, Oklahoma State University, 1964. 31 pp.

Eggenberger, Ulrich L. *An Analysis of High School Vocational Agriculture from Evaluations of Graduates in West Texas*. Doctor's thesis. Ames: Iowa State University of Science and

Technology, 1964. 166 pp. Abstract: *Dissertation Abstracts* 25: 2812; No. 4, 1964.

Ehresman, Norman D. *An Experimental Study to Evaluate the Effectiveness of Certain Structured Teaching Materials*. Doctor's thesis. Urbana: University of Illinois, 1966. 80 pp.

Elliott, Wallace H. "After Vo-Ag What?" *Agricultural Education Magazine* 33: 259-260; May 1961.

Espenschied, Roland F. *Major Findings of a Study of Parental Attitudes Toward Vocational Agriculture*. Doctor's thesis. Urbana: University of Illinois, 1961. 93 pp. Abstract: *Dissertation Abstracts* 22: 3467; No. 10, 1962.

Federal Board for Vocational Education. *Training Objectives in Vocational Education in Agriculture*. Bulletin No. 153, Agricultural Series No. 39. Washington, D.C.: Government Printing Office, 1931. 31 pp.

Fiscus, Keith E. *A Comparison of Certain Knowledges in Agriculture Needed by Workers in Farming, in Grain Elevator Businesses, and in Agricultural Equipment Businesses*. Doctor's thesis. Urbana: University of Illinois, 1965. 330 pp. Abstract: *Dissertation Abstracts* 26: 2600; No. 5, 1965.

Flood, Riefford B. *Factors Associated With Success of Adult Education in Vocational Agriculture in Arkansas*. Doctor's thesis. Fayetteville: University of Arkansas, 1964. 233 pp. Abstract: *Dissertation Abstracts* 25: 1708; No. 3, 1964.

Freeh, Lavern A. *Characteristics and Influence Patterns of Students Enrolling in Agricultural Curricula at Michigan State University*. Doctor's thesis. East Lansing: Michigan State University, 1962. 118 pp. Abstract: *Dissertation Abstracts* 23: 1137; No. 4, 1962.

Fuller, Gerald R. *The Relationship of Characteristics of Prospective Teachers and Student Teaching Effectiveness in Agricultural Education*. Doctor's thesis. Ithaca, N.Y.: Cornell University, 1963. 388 pp. Abstract: *Dissertation Abstracts* 24: 2799: No. 7, 1964.

Fuller, Gerald R. "Factor Analysis as Applied to Curriculum Development." *The Journal of the American Association of Teacher Educators in Agriculture* 5: 2-4; July 1965. (a)

Fuller, Gerald R. *Technical Education in and for Rural Areas: Agricultural Supply Curriculum*. Urbana: Vocational and Technical Education Department, University of Illinois, 1965. 21 pp. (b)

Fuller, Robert D. Delegation of Responsibilities in a Multiple-Teacher Department of Vocational Agriculture. Master's thesis. Columbus: The Ohio State University, 1963. 101 pp.

Gadda, Hilding W. An Evaluation of the Pre-Service Program of Teacher Education in Agriculture at South Dakota State College. Doctor's thesis. East Lansing: Michigan State University, 1963. 230 pp. Abstract: Dissertation Abstracts 24: 2799: No. 7, 1964.

Galloway, R. Edward. A Comparison of the Readability of Vocational Agriculture Reference Books With the Reading Ability of the Students Using Them. Doctor's thesis. Lafayette, Ind.: Purdue University, 1960. 122 pp. Abstract: Dissertation Abstracts 21: 1846; No. 7, 1961.

Ganzel, Ronald W. A Study to Determine the Number of Farming Opportunities Likely to Become Available in the Pawnee City School Patronage Area From 1963-1973. Master's thesis. Lincoln: University of Nebraska, 1964. 57 pp.

Gardner, Harrison. Determining Competencies for Initial Employment in the Dairy Farm Equipment Business. Doctor's thesis. East Lansing: Michigan State University, 1964. 238 pp.

Gibson, Robert H. Effects of Nonvocational Loads on Programs of Instruction in Vocational Agriculture in Tennessee. Doctor's thesis. Columbia: University of Missouri, 1963. 137 pp. Abstract: Dissertation Abstracts 24: 2750; No. 7, 1964.

Halterman, Jerry J. Technicians in Agriculture: A Research Project in Agriculture Technology. Sacramento: California State Department of Education, 1962. 50 pp.

Halterman, Jerry J. Determination of the Educational Needs of Agricultural Engineering Technicians in Ohio. Doctor's thesis. Columbus: The Ohio State University, 1964. 300 pp. Abstract: Dissertation Abstracts 25: 7125; No. 12, 1965.

Hamilton, William H. Competencies in Agriculture Needed by Males Employed in Retail Feed Distribution. Master's thesis. Ames: Iowa State University of Science and Technology, 1964. 126 pp.

Hamlin, H. M. "Agricultural Education." In W. S. Monroe (Ed.), Encyclopedia of Educational Research. New York: Macmillan Co., 1941. Pp. 32-40.

Hamlin, Herbert M. Public School Education in Agriculture. Danville, Ill.: Interstate, 1962. 328 pp.

Hamlin, H. M., and Deyoe, G. P. "Agricultural Education." In W. S. Monroe (Ed.), Encyclopedia of Educational Research. (Revised Edition) New York: Macmillan Co., 1950. Pp. 35-44.

Hannemann, James W. *The Effectiveness of Teaching Parliamentary Procedure Through the Use of Programed Instruction*. Master's thesis. Ithaca, N.Y.: Cornell University, 1964. 115 pp.

Hayes, Glenn W. *The Relationship of Socio-Economic Status of Pupils to Their Comprehension of Reference Materials Written at Different Levels of Readability*. Doctor's thesis. Urbana: University of Illinois, 1966. 113 pp.

Hayles, Jasper Asberry, Jr. *Occupational Experiences of High School Graduates Who Completed Four Years of Vocational Agriculture in Louisiana*. Doctor's thesis. Baton Rouge: Louisiana State University, 1963. 165 pp. Abstract: *Dissertation Abstracts* 24: 2203; No. 6, 1963.

Heimlich, Richard E. *The Non-Vocational Programs in Agriculture in the Public Schools in Ohio*. Master's thesis. Columbus: The Ohio State University, 1964. 70 pp.

Hemp, Paul E. *An Analysis and Appraisal of FFA and Vocational Agriculture Contests and Award Programs in Illinois*. Urbana: College of Education, University of Illinois, 1961. 89 pp.

Hemp, Paul E. "Significant Recent Research in Public School Education in Agriculture." In J. R. Warmbrod (Ed.), *New Dimensions in Public School Education in Agriculture*. Danville, Ill.: Interstate, 1962. Pp. 63-76.

Hemp, Paul E., Phipps, Lloyd J., Warmbrod, Robert, Ehresman, Norman, and McMillion, Martin. *Illinois Agricultural Education Curriculum Research Project: Pilot Programs in Agricultural Education*. Final Report. Urbana: Vocational and Technical Education Department, University of Illinois, 1966. 58 pp.

Hoerner, Thomas A. *Relationship of High School Vocational Agriculture to Achievement in Agricultural Engineering Courses at the Iowa State University of Science and Technology*. Master's thesis. Ames: Iowa State University of Science and Technology, 1963. 80 pp.

Hoerner, Thomas A. *Factors Related to Employment of Iowa State University Graduates in Agricultural Education*. Doctor's thesis. Ames: Iowa State University of Science and Technology, 1965. 170 pp. Abstract: *Dissertation Abstracts* 26: 5265: No. 9, 1966.

Hollenberg, Alvin H. *Farm Mechanics in Vocational Agriculture--A Survey*. Vocational Division Bulletin No. 280, Agricultural Series No. 74. Washington, D.C.: Government Printing Office, 1959. 28 pp.

Holt, Oris M. *A Study of the Vocational Agriculture Adult Education Program as Conducted by the Texas Education Agency Adult Specialists*. Doctor's thesis. Houston, Texas: University of Houston, 1962. 220 pp. Abstract: *Dissertation Abstracts* 23: 3202; No. 9, 1963.

Hoover, Norman K. *Factors Associated With Establishment in Related Agricultural Occupations and Their Relationship to the High School Curriculum in Vocational Agriculture*. Doctor's thesis. University Park: Pennsylvania State University, 1957. 127 pp. Abstract: *Dissertation Abstracts* 17: 1010; No. 5, 1957.

Hoover, Norman K., McClay, David R., and Stevens, Glenn Z. *Off-Farm Agricultural Occupations in Pennsylvania: Employment Opportunities and Technical Education Needs*. Teacher Education Research Series, Volume 7, Number 1. University Park: Department of Agricultural Education, Pennsylvania State University, 1966. 36 pp.

Hoover, Norman K., and Weyant, J. Thomas. "An Agri-Business Pilot Project." *Agricultural Education Magazine* 38: 55, 68; September 1965.

Hopkins, H. Palmer. *Professional Relations of State Leaders in Vocational Agricultural Education*. Doctor's thesis. Washington, D.C.: George Washington University, 1963. 194 pp.

Horner, James T., and Benson, Donavon. "Three Farms for Every Vo Ag Graduate." *Agricultural Education Magazine* 36: 62-63; September 1963.

Horner, J. T., Nuttle, J. R., and Schnieder, R. D. *Academic Achievement, Course Patterns and Persistence of Former Students of Vocational Agriculture Contrasted With Non-Vocational Agriculture Students of the College of Agriculture, University of Nebraska*. Lincoln: Department of Agricultural Education, University of Nebraska, 1960. 20 pp.

Hoyt, Lindley J. *Competencies in Livestock Marketing Needed by Farmers*. Master's thesis. Ames: Iowa State University of Science and Technology, 1965. 120 pp.

Hull, William L. *A Procedure for Sequencing Self-Instructional Materials for Concept Attainment of Human Relations Abilities in Agricultural Business Occupations*. Doctor's thesis. University Park: Pennsylvania State University, 1965. 87 pp. Abstract: *Dissertation Abstracts* 26: 6270; No. 11, 1966.

Hull, William L., and McClay, David R. *A Comparison of Programed and Lecture-discussion Methods of Teaching Farm Credit to High School Youth and Adults*. Bulletin 722. University Park: Agricultural Experiment Station, Pennsylvania State University, 1965. 22 pp.

Hutchinson, James H. A Study of the Participating Experiences of Student Teachers of Vocational Agriculture. Doctor's thesis. Baton Rouge: Louisiana State University, 1961. 131 pp. Abstract: Dissertation Abstracts 22: 2301; No. 7, 1962.

Jabro, Salim H. Curricula in Agricultural Education at the Land-Grant Colleges and Universities in the United States. Doctor's thesis. Ames: Iowa State University of Science and Technology, 1962. 270 pp. Abstract: Dissertation Abstracts 23: 940: No. 3, 1962.

Jacoby, Walter. Policies and Practices in the Administration of Multiple-Teacher Vocational Agriculture Departments in the United States. Doctor's thesis. Storrs: University of Connecticut, 1961. 274 pp. Abstract: Dissertation Abstracts 22: 2657; No. 8, 1962.

James, Gerald B. "New Dimensions in Agricultural Education in North Carolina." In J. R. Warmbrod (Ed.), New Dimensions of Public School Education in Agriculture. Danville, Ill.: Interstate, 1962. Pp. 17-22.

James, Kenneth E. Influence of Vocational Agriculture on Farming in Chariton County With Implications for Adjustment. Doctor's thesis. Columbia: University of Missouri, 1961. 244 pp. Abstract: Dissertation Abstracts 22: 2633: No. 8, 1962.

Jarmin, Martin V. Prediction of Success in the Student Teaching Program for Prospective Teachers of Vocational Agriculture at the New York State College of Agriculture at Cornell University. Doctor's thesis. Ithaca, N.Y.: Cornell University, 1963. 99 pp. Abstract: Dissertation Abstracts 24: 3219: No. 9, 1964.

Jensen, Arthur K. An Analysis of Farm Mechanics Knowledge and Skills Needed by Wisconsin Farmers. Doctor's thesis. Madison: University of Wisconsin, 1961. 115 pp. Abstract: Dissertation Abstracts 22: 778: No. 3, 1961.

Joint Committee of the U.S. Office of Education and the American Vocational Association. Objectives for Vocational and Technical Education in Agriculture. Office of Education Bulletin 1966, No. 4. Washington, D.C.: Government Printing Office, 1965. 12 pp.

Judge, Homer V. Work Experiences of Michigan High School Students of Vocational Agriculture and Their Relation to Occupational and Educational Plans. Doctor's thesis. East Lansing: Michigan State University, 1963. 241 pp. Abstract: Dissertation Abstracts 24: 1029: No. 3, 1963.

Judge, Homer V. Employment Opportunities and Needed Competencies in Off-Farm Agricultural Occupations in Massachusetts. Boston: Division of Vocational Education, Massachusetts Department of Education, 1965. 47 pp.

Kahler, Alan A. Competencies in Agriculture Needed by Males Employed in Retail Machinery Distribution. Master's thesis. Ames: Iowa State University of Science and Technology, 1964. 201 pp.

Kantner, Earl F. Adapting the FFA to a Changing Program of Vocational Agriculture. Doctor's thesis. Columbus: The Ohio State University, 1965. Abstract: Dissertation Abstracts 27: 4-B: No. 1, 1966.

Kent, Linwood E. Vocational Agriculture in Virginia Since 1917, With Recommendations for Future Development. Durham, N.C.: Duke University, 1963. 150 pp. Abstract: Dissertation Abstracts 23: 4066; No. 11, 1963.

Krebs, Alfred H. Future Plans of Vocational Agriculture Seniors in Illinois High Schools, Classes of 1959. Urbana: Division of Agricultural Education, University of Illinois, 1959. 11 pp.

Krebs, Alfred H. College Success of Students Enrolled in the College of Agriculture. Urbana: Division of Agricultural Education, University of Illinois, 1961. 21 pp.

Krebs, Alfred H. "Guiding Principles for Evaluation Under the Vocational Education Act of 1963." Agricultural Education Magazine 37: 238-239, 253; April 1965.

Kuntz, Robert H., and Edington, Everett D. "Tests Can Predict Success of ARA Enrollees." Agricultural Education Magazine 37: 197-198; February 1965.

Kuykendall, Lloyd. "Adult Farmer Training in M.D.T.A." Agricultural Education Magazine 38: 210; March 1966.

Lamberth, Edwin E. "Principals Evaluate Tennessee Vo Ag Programs." Agricultural Education Magazine 36: 274-275; June 1964.

Langdon, Charles L. A Survey of Agricultural Occupations in Michigan. Lansing: Michigan Department of Public Instruction, 1965. 140 pp.

Lasap, Sotero L., Jr. Relationship of Selected Pre-College Experiences to Success in Teaching Vocational Agriculture. Master's thesis. College Park: University of Maryland, 1964. 95 pp.

Law, Charles J., Jr. Relationship of Position and Tenure to Role Expectations for District Supervisors. Master's thesis. Raleigh: North Carolina State University, 1964. 87 pp.

Legg, Otto P. Programed-Instruction and Lecture-Discussion Methods Compared for Effectiveness in Teaching Agricultural Finance to Vocational Agriculture Students. Doctor's thesis. University Park: Pennsylvania State University, 1962. 90 pp. Abstract: Dissertation Abstracts 23: 2447; No. 7, 1963.

Lester, H. T., Jr. "Establishing Young Men in a Farm Business." *Agricultural Education Magazine* 34: 42-44; August 1961.

Linson, Marvin G. *A Guide for Self-Evaluation of State Supervisory Programs in Vocational Education in Agriculture.* Doctor's thesis. Columbus: The Ohio State University, 1964. 203 pp. Abstract: *Dissertation Abstracts* 25: 7047; No. 12, 1965.

Lockwood, Larry L. *Competencies Needed by Males Engaged in Dairy Farming.* Master's thesis. Ames: Iowa State University of Science and Technology, 1964. 97 pp.

Love, Gene M., and Stevens, Glenn Z. *Educational Effectiveness of Three Sequences of Scheduling Classes and of Three Patterns of Supervision and Instruction in an Inservice Education Course for Teachers.* University Park: Department of Agricultural Education, Pennsylvania State University, 1964. 18 pp.

Mabon, Elwood J. *Competencies in Agriculture Needed by Males Employed in Country Elevator Grain Marketing.* Master's thesis. Ames: Iowa State University of Science and Technology, 1964. 160 pp.

Macomber, Floyd D. *Performance Comparisons Between Vocational Agriculture Students and Nonvocational Agriculture Students in the Four-Year Program of the College of Agriculture at Cornell University.* Master's essay. Ithaca, N.Y.: Cornell University, 1961. 30 pp.

Madison, Eldon H. *The Effectiveness of Visual Aids in Presenting an Analysis of Selected Farm Management Factors.* Doctor's thesis. Minneapolis: University of Minnesota, 1962. 82 pp. Abstract: *Dissertation Abstracts* 24: 145; No. 1, 1963.

Martin, W. Howard. "Agricultural Education." *Review of Educational Research* 17: 240-250; June 1947.

Martin, W. Howard. "Abilities and Careers of Connecticut High School Graduates in Vocational Agriculture." *Agricultural Education Magazine* 35: 266-267; June 1963.

McComas, James D. *The Role of the Teacher of Vocational Agriculture as Perceived by Selected Ohio Teachers and Their Administrators.* Doctor's thesis. Columbus: The Ohio State University, 1962. 235 pp. Abstract: *Dissertation Abstracts* 24: 145; No. 1, 1963.

McCormick, Floyd G. *The Development of an Instrument for Measuring the Understanding of Profit-Maximizing Principles.* Doctor's thesis. Columbus: The Ohio State University, 1964. 225 pp. Abstract: *Dissertation Abstracts* 25: 1033; No. 2, 1964.

McCracken, John D. *Relation of High School Vocational Agriculture to Achievement in College Courses in Agronomy.* Master's thesis. Ames: Iowa State University of Science and Technology, 1962. 77 pp.

McMillion, Martin B. Relationship of Socio-Economic Position to the Connotative Meaning of Certain Words Used in Vocational Agriculture. Doctor's thesis. Urbana: University of Illinois, 1966. 135 pp.

Miller, Texton R. Teacher Adoption of a New Concept of Supervised Practice in Agriculture. Raleigh: Department of Agricultural Education, North Carolina State University, 1965. 30 pp.

Moeckel, Rolf E. The Effectiveness of Practices of Individual On-Farm Instruction Used by Teachers of Adult Farmer Courses in Michigan. Doctor's thesis. East Lansing: Michigan State University, 1960. 201 pp. Abstract: Dissertation Abstracts 21: 3338; No. 11, 1961.

Mondart, C. L., and Curtis, C. M. Occupational Opportunities and Training Needs for Nonfarm Agricultural Jobs in the Metropolitan Areas of Louisiana. Baton Rouge: Department of Vocational Agricultural Education, Louisiana State University, 1965. 108 pp.

Morrison, Richard G. Development and Application of Techniques and Procedures for Determining Training Needs and Occupational Opportunities for Students of Vocational Agriculture Within the Baton Rouge Agri-Business Complex. Doctor's thesis. Baton Rouge: Louisiana State University, 1964. 434 pp. Abstract: Dissertation Abstracts 26: 584; No. 2, 1965.

Myers, David W. Present Occupational Status of Individuals Who Qualified to Teach Vocational Agriculture from Washington State University 1942-1961. Master's thesis. Pullman: Washington State University, 1964. 33 pp.

National Center for Advanced Study and Research in Agricultural Education. Report of a National Seminar on Agricultural Education--A Design for the Future. Columbus: The Ohio State University, 1963. 235 pp. (a)

National Center for Advanced Study and Research in Agricultural Education. Report of Research Coordination Conference on Agricultural Occupations. Columbus: The Ohio State University, 1963. 92 pp. (b)

National Center for Advanced Study and Research in Agricultural Education. Report of Second Research Coordination Conference on Agricultural Occupations. Columbus: The Ohio State University, 1964. 99 pp.

National Study of Secondary School Evaluation. Evaluative Criteria. (1960 Edition) Washington, D.C.: National Study of Secondary School Evaluation, 1960. 376 pp.

Nelson, Norbert J., Woerdehoff, Frank J., and Coster, John K. Vocational Education in Public Schools as Related to Social, Economic and Technical Trends: Part II. The Appraisal of Programs of Vocational Agriculture and Industrial Education. Studies in

Education No. 2. Lafayette, Ind.: Division of Education, Purdue University, 1960. 489 pp.

Nielsen, Duane M. *Relationship of High School Vocational Agriculture and Size of Home Farm to Establishment of Graduates in Farming.* Doctor's thesis. Ames: Iowa State College, 1958. 129 pp. Abstract: *Dissertation Abstracts* 19: 472; No. 3, 1958.

Nielsen, Duane M. "Research and Development in Agricultural Education." *Agricultural Education Magazine* 38: 102-103, 116-117; November 1965.

O'Kelley, C. L., Jr. *The Preparation of Teachers--A Survey of Supervised Teaching Programs in 1957-58.* Vocational Division Bulletin No. 295, Agricultural Series No. 78. Washington, D.C.: Government Printing Office, 1961. 75 pp.

O'Kelley, G. L., Jr., and Lester, H. T., Jr. *A Comparison of the College Performance of Students Who Did and Those Who Did Not Study Vocational Agriculture in Georgia High Schools in Terms of Grades Earned During the Freshmen Year of Study at the University of Georgia During the 1960-61 School Year.* Athens: Department of Agricultural Education, University of Georgia, 1963. 36 pp.

O'Kelley, G. L., Jr., and Lester, H. T., Jr. *A Comparison of Farmers Who Studied Vocational Agriculture in High School and Those Who Did Not in Terms of Their Tendencies to Adopt Improved Farming Practices.* Athens: Department of Agricultural Education, University of Georgia, 1965. 51 pp.

Omar, Ahmed M. *Working Relationships of County Extension Agents and Teachers of Vocational Agriculture in Michigan.* Doctor's thesis. East Lansing: Michigan State University, 1963. 264 pp. Abstract: *Dissertation Abstracts* 25: 945; No. 2, 1964.

Panel of Consultants on Vocational Education. *Education for a Changing World of Work.* Washington, D.C.: Government Printing Office, 1963. 296 pp.

Pearce, Frank C. *The Educational Needs of Beginning Farm Operators in Becoming Established in New York.* Doctor's thesis. Ithaca, N.Y.: Cornell University, 1964. 371 pp. Abstract: *Dissertation Abstracts* 25: 4518; No. 8, 1965.

Phipps, Lloyd J. "Agricultural Education." *Review of Educational Research* 26: 359-369; October 1956.

Phipps, Lloyd J. "Agricultural Education." *Review of Educational Research* 32: 384-392; October 1962. (a)

Phipps, Lloyd J. "Research Design in Agricultural Education." In J. R. Warmbrod (Ed.), *New Dimensions in Public School Education in Agriculture.* Danville, Ill.: Interstate, 1963. Pp. 55-63. (b)

Phipps, Lloyd J. *Handbook on Agricultural Education in Public Schools.* Danville, Ill.: Interstate, 1965. 774 pp. (a)

Phipps, Lloyd J. "How to Develop and Evaluate Pilot Programs." *American Vocational Journal* 40: 26-28; September 1965. (b)

Phipps, Lloyd J., and Fuller, Gerald R. *Project REDY, Rural Education--Disadvantaged Youth.* A Research Prospectus. Urbana: Agricultural Education Division, University of Illinois, 1965. 7 pp.

Phipps, Lloyd J., Krebs, A. H., Hemp, P., Warmbrod, J. R., and Fuller, G. R. *Technical Education in and for Rural Areas: Technicians and Other Workers Who Need Technical Knowledge.* Preliminary Report No. 1. Urbana: Vocational and Technical Education Department, University of Illinois, 1964. 74 pp.

Pierce, Dewey. *The Relation of Vocational Agriculture Experience to Scholastic Achievement at The Ohio State University.* Doctor's thesis. Columbus: The Ohio State University, 1960. 247 pp. Abstract: *Dissertation Abstracts* 21: 2952; No. 10, 1961.

Pamper, Fred J., and Sledge, George W. "Vocational Agriculture and Success in College." *Agricultural Education Magazine* 34: 273-275; June 1962.

Quan, Franklin D. *A Study of Establishment in Farming in the Ellendale Area.* Master's thesis. Minneapolis: University of Minnesota, 1965. 48 pp.

Rempel, Averno M., and Bentley, Ralph R. "Factors Affecting the Morale of Vocational Agriculture Teachers." *Agricultural Education Magazine* 35: 236-238; May 1963.

Research Committee of the Southern Region. *What Constitutes an Effective Program of Vocational Agriculture in a Community,* 1956. 64 pp.

Rhody, Billy L. *Agricultural Education Majors Who Graduated From the University of Tennessee College of Agriculture From the Summer Quarter, 1955, Through the Summer Quarter, 1964.* Master's thesis. Knoxville: University of Tennessee, 1964. 84 pp.

Richard, C. E., and Bass, B. C. "Vo Ag Tends to Hold High School Students." *Agricultural Education Magazine* 38: 108-109; November 1965.

Roberts, Roy W. *Evaluation of the Effectiveness of Instruction in Agricultural Mechanics for Vocational Agriculture Students in Arkansas Who Enter Non-Farming Occupations.* Fayetteville: College of Education, University of Arkansas, 1965. 49 pp.

Robinson, Norman L. *Competencies in Farm Machinery Maintenance Needed by Farmers.* Master's thesis. Ames: Iowa State University of Science and Technology, 1964. 88 pp.

Robinson, Ted R. *Factors Related to the Occupations of Iowa Farm Male High School Graduates*. Doctor's thesis. Ames: Iowa State University of Science and Technology, 1964. 257 pp. Abstract: *Dissertation Abstracts* 25: 6353; No. 11, 1965.

Rodgers, John H. *Participation of Ohio Part-Time Farmers in Young Farmer Programs in Vocational Agriculture*. Doctor's thesis. Columbus: The Ohio State University, 1961. 236 pp. Abstract: *Dissertation Abstracts* 22: 2303; No. 7, 1962.

Rogers, Charles H. *Factors Associated With Supervising Teacher Effectiveness*. Doctor's thesis. Ithaca, N.Y.: Cornell University, 1964. 190 pp. Abstract: Dissertation Abstracts 25: 7102; No. 12, 1965.

Schroeder, Wayne E. *Role Expectations of State Supervision in Vocational Agriculture*. Doctor's thesis. Columbus: The Ohio State University, 1962. 162 pp. Abstract: *Dissertation Abstracts* 24: 595; No. 2, 1963.

Shoemaker, Karl. "Impact of Economic Changes on the Farm Community and on Opportunities for Farm Youth." Paper read at Annual Agricultural Outlook Conference, Washington, D.C., November 1961.

Shontz, David F. *An Experiment in Teaching Agricultural Occupations Information to High School Students*. Doctor's thesis. University Park: Pennsylvania State University, 1963. 101 pp. Abstract: *Dissertation Abstracts* 24: 5256; No. 12, 1964.

Shoup, Charles A. *Factors Affecting the Occupational Choice of Agricultural Education Graduates*. Master's thesis. Ithaca, N.Y.: Cornell University, 1965.

Sledge, George W. "Agricultural Education." In Chester W. Harris (Ed.), *Encyclopedia of Educational Research*. (Third Edition) New York: Macmillan Co., 1960. Pp. 48-59.

Smith, William A. "Agricultural Education." *Review of Educational Research* 14: 327-336; October 1944.

Snepp, Neil O. *Agricultural Offerings in Community Colleges in the United States*. Doctor's thesis. Columbus: The Ohio State University, 1963. 244 pp. Abstract: *Dissertation Abstracts* 24: 4589; No. 11, 1964.

Solstad, Arnold K. *A Study of the Relationship Between Income of Farmers in the Minnesota Vocational Agriculture Farm Management Service and Their Activities in the Farm Power and Machinery Area With Implications for a Course of Study*. Doctor's thesis. Minneapolis: University of Minnesota, 1963. 128 pp. Abstract: *Dissertation Abstracts* 24: 1933; No. 5, 1963.

Starling, John T. *Integrating Biological Principles With Instruction in Vocational Agriculture.* Doctor's thesis. Columbus: The Ohio State University, 1964. 153 pp. Abstract: *Dissertation Abstracts* 25: 7031; No. 12, 1965.

Stevenson, William W. *A Study of Employment Opportunities and Training Needs in Off-Farm Agricultural Occupations in Oklahoma.* Stillwater: Oklahoma State University, 1965. 89 pp.

Strait, Leland C. *Factors Contributing to Declining Enrollments in the College of Agriculture at Washington State University.* Doctor's thesis. Pullman: Washington State University, 1963. 134 pp. Abstract: *Dissertation Abstracts* 25: 1671; No. 3, 1964.

Sutherland, S. S. "Agricultural Education." *Review of Educational Research* 20: 330-338; October 1950.

Sutherland, S. S. *Biological Principles Related to Agriculture.* Sacramento: California State Department of Education, 1962. 116 pp.

Swanson, Robert M. *Opportunities for Establishment of Young Farmers in the Marengo, Iowa, Community.* Master's thesis. Ames: Iowa State University of Science and Technology, 1961. 59 pp.

Taylor, Lewis C. *A Delineation of Farm Mechanics Managerial Competencies for New York State Dairy Farmers and an Interpretation of Their Use in the Preparation of Courses of Study.* Doctor's thesis. Ithaca, N.Y.: Cornell University, 1962. 193 pp. Abstract: *Dissertation Abstracts* 23: 3253; No. 9, 1963.

Taylor, Robert E. *An Inservice Education Program for State Supervisors of Vocational Education in Agriculture.* Doctor's thesis. Columbus: The Ohio State University, 1961. 483 pp. Abstract: *Dissertation Abstracts* 22: 4247; No. 12, 1962.

Taylor, Robert E. "State Programs of Research and Development." *Agricultural Education Magazine* 38: 156-157, 167; January 1966.

Thomas, James D., Jr. *A Comparative Study of Initial Achievement of Agricultural College Students.* Doctor's thesis. Lafayette, Ind.: Purdue University, 1960. 164 pp. Abstract: *Dissertation Abstracts* 21: 1809; No. 7, 1961.

Thompson, O. E. "New Dimensions in Agricultural Education in California." In J. R. Warmbrod (Ed.), *New Dimensions in Public School Education in Agriculture.* Danville, Ill.: Interstate, 1962. Pp. 23-28. (a)

Thompson, O. E. "What Are the Plans of Vocational Agriculture Students?" *Agricultural Education Magazine* 34: 276-278; June 1962. (b)

Thompson, O. E. "Characteristics of California Vo-Ag Students." Agricultural Education Magazine 35: 144-145: January 1963. (a)

Thompson, O. E. "How Important Are Occupational Values of Students of Agriculture?" Agricultural Education Magazine 35: 238-240; May 1963. (b)

Todd, Hollis E. A Role Analysis of the Perceptions of the Beginning Vocational Agriculture Teachers and Their Professional Difficulties in Role Performance. Doctor's thesis. Columbus: The Ohio State University, 1965. 249 pp. Abstract: Dissertation Abstracts 26: 6537; No. 11, 1966.

Tom, Frederick K. T. "College Success of Former Students of Vocational Agriculture." Agricultural Education Magazine 32: 172-176; February 1960.

Tugend, David M. Comparative Study of Selected Farm Mechanical Skills Performed by Successful Maryland Farm Operators and Farm Mechanical Skills Taught in Vocational Agriculture in Certain Maryland High Schools. Master's thesis. College Park: University of Maryland, 1964. 124 pp.

U.S. Department of Labor. Manpower Research and Training Under the Manpower Development and Training Act of 1962. Washington, D.C.: Government Printing Office, 1965. 212 pp.

U.S. Department of Labor. Report of the Secretary of Labor on Manpower Research and Training Under the Manpower Development and Training Act of 1962. Washington, D.C.: Government Printing Office, 1966. 216 pp.

U.S. Office of Education. Educational Objectives in Vocational Agriculture. Vocational Division Monograph No. 21. Washington, D.C.: Government Printing Office, 1940. 14 pp.

U.S. Office of Education. Educational Objectives in Vocational Agriculture. Vocational Division Monograph No. 21 (Revised). Washington, D.C.: Government Printing Office, 1955. 14 pp.

U.S. Office of Education. Vocational and Technical Education: A Review of Activities in Federally Aided Programs, Fiscal Year 1963. Washington, D.C.: Government Printing Office, 1964. 68 pp.

U.S. Office of Education. Subject Offerings and Enrollments in Public Secondary Schools. Washington, D.C.: Government Printing Office, 1965. 115 pp.

Van Loh, Frederick A. Competencies in Agriculture Needed by Males Employed in Retail Feed Distribution. Master's thesis. Ames: Iowa State University of Science and Technology, 1964. 110 pp.

Vorhies, Ralph M. Status and Role of the Non-Transfer Agricultural Education Program in California Junior Colleges. Doctor's thesis. Columbia: University of Missouri, 1964. 190 pp. Abstract: Dissertation Abstracts 26: 806; No. 2, 1965.

Walker, Robert W. Development of a Vocational Agriculture Interest Inventory for Guidance of Eighth Grade Students. Doctor's thesis. University Park: Pennsylvania State University, 1962. 117 pp. Abstract: Dissertation Abstracts. 23: 3702; No. 10, 1963.

Warmbrod, J. R. State Policies for Distributing State and Federal Funds for Vocational Education in Agriculture to Local School Districts. Doctor's thesis. Urbana: University of Illinois, 1962. 291 pp. Abstract: Dissertation Abstracts 23: 2403; No. 7, 1963.

Warmbrod, J. R. "Reimbursement Policies Influence Young Farmer and Adult Farmer Education." Agricultural Education Magazine 37: 148-150; December 1964.

Warmbrod, J. R. "The Sampling Problem in Research Design." Agricultural Education Magazine 38: 106-107, 114-115; November 1965.

Warmbrod, J. R. Technical Education in and for Rural Areas: Manpower Needs and Employment Opportunities for Workers Needing Knowledge and Skill in Agriculture. Report No. 2. Urbana: Vocational and Technical Education Department, University of Illinois, 1966. 37 pp.

Webb, Earl S. Educational and Employment Status of 1960 Graduates Who Were Enrolled in Vocational Agriculture With Implications for Vocational Guidance. Columbia: Department of Agricultural Education, University of Missouri, 1961. 17 pp.

Well, William. A Comparison of the Farmers in the Medina, North Dakota Public School District Who Have Attended Adult and Young Farmer Courses and Those Who Have Not Attended. Master's thesis. Fargo: North Dakota State University, 1965. 50 pp.

Wessman, Elwood D. Areas of Research Need and Areas of Research Concentration in the Field of Agricultural Education. Master's thesis. Minneapolis: University of Minnesota, 1963. 41 pp.

Wilkins, Virgil L. An Analysis of Factors Which Discriminate in the Selection of National FFA Chapter Award Winners. College Park: Department of Agricultural and Extension Education, University of Maryland, 1965. 23 pp.

Williams, John R. Occupations of Former Students of Vocational Agriculture in Arizona. Report Number 227. Tucson: Agricultural Experiment Station, University of Arizona, 1965. 18 pp.

Wilson, E. F., and Witten, Morris. "Training Provided in Agricultural Distribution." Agricultural Education Magazine 38: 54, 69; September 1965.

Wood, Eugene S. "What Adjustments Should Vocational Agriculture Make to Better Serve Adults Under the Vocational Act of 1963?" Agricultural Education Magazine 38: 250; May 1966.

Woodin, Ralph J. "Teachers Key Man in Recruitment Drive." Agricultural Education Magazine 38: 272-273; June 1966.

Zarraga, Jose Cruz. The Development and Experimental Trial of Programed Learning Material in Teaching Farm Business Management to Vocational Agriculture Students. Doctor's thesis. Minneapolis: University of Minnesota, 1963. 129 pp. Abstract: Dissertation Abstracts 24: 4491; No. 11, 1964.

Zurbrick, Phillip R. The Status of Specialized Courses in Vocational Agriculture. Tucson: Department of Agricultural Education, University of Arizona, 1965. 12 pp.

OTHER CENTER PUBLICATIONS

"Guidelines for State Supervisors in Office Occupations Education." 1965 Business Clinic

A Report of a National Seminar on Agriculture Education, "Program Development and Research.

"Guidance in Vocational Education." - Guidelines for Research and Practice.

"Research Planning in Business and Office Education."

"Evaluation and Program Planning in Agricultural Education."

"A Report of a National Seminar on Health Occupations Education Centers."

"A Report of a National Seminar on Cooperative Education."

A Report of "A National Leadership Seminar on Home Economics Education."

"Systems Under Development for Vocational Guidance." - A Report of a Research Exchange Conference.

"Guidelines in Cooperative Education."

"A Survey of Vocational Education Programs for Students with Special Needs."